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This report performs a theoretical economic analysis of the incentives embodied within a variety of existing and proposed land use control techniques and, then, employs this analytical framework to examine the social desirability of supplementing or replacing the existing body of land use control mechanisms with any of several innovative policies for the regulation of the use of land. Thus, this report first investigates the economic and legal relationships between alternative assignments of property rights in the use of resources and the levels of external effects attributable to the use of these resources. Then, the administrative, legal, economic, and political limitations of the traditional land use control mechanisms of municipal zoning, subdivision regulation, building codes, and eminent domain condemnation are examined. Next, a set of basic concepts is developed for the evaluation of the potential economic efficiency and social desirability of any mechanism for the optimal control of external effects or the optimal provision of public facilities. Finally, using these concepts, the potential economic efficiency, legal feasibility, administrative tractability, political acceptability, and social desirability of implementing several innovative and, as yet, relatively untried land use control mechanisms are assessed. Bibliography and literature survey. is included.

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ECONOMIC INCENTIVES FOR LAND USE CONTROL

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FOREWORD

The basic premise of land use controls is to reduce the effect of noncompensated, negative externalities that one land owner might inflict on others. Individuals in an effort to avoid the negative externalities that might be inflicted on them, have established various property rights and legal restrictions through the political process. These rights and restrictions have developed to promote economic efficiency and equity. Questions arise, however, as to the relative economic efficiency and equity of traditional proscriptive land use controls and to the potential economic effects of using controls based on economic incentives. This report primarily reviews and addresses these questions from a theoretical economics viewpoint.

This report was purposely directed towards theoretical aspects in order to form a solid base for further land use management and implementation strategies research. The conclusions of this theoretical research help to establish reasonable bounds on the types of land use management strategies that may economically internalize land use externalities.

The Environmental Management program of the Office of Air, Land and Water Use is directed toward improving the capabilities of state, regional, and local governments for instituting and managing environmental programs. It does this by providing them with improved information and methods for identifying and describing alternative solutions to specific environmental problems and for selecting and implementing the best solution.

The program considers four fundamental functions performed by public administrators: planning, evaluation, implementation, and enforcement. It emphasizes intermedia and secondary effects of environmental management actions, implementation incentives and institutional arrangements, and consideration of the complete range of implementation measures, and public education programs, as well as the traditional regulatory mechanisms.

ABSTRACT

This report performs a theoretical economic analysis of the incentives embodied within a variety of existing and proposed land use control techniques and, then, employs this analytical framework to examine the social desirability of supplementing or replacing the existing body of land use control mechanisms with any of several innovative policies for the regulation of the use of land. Thus, this report first investigates the economic and legal relationships between alternative assignments of property rights in the use of resources and the levels of external effects attributable to the use of these resources. Then, the administrative, legal, economic, and political limitations of the traditional land use control mechanisms of municipal zoning, subdivision regulation, building codes, and eminent domain condemnation are examined. Next, a set of basic concepts is developed for the evaluation of the potential economic efficiency and social desirability of any mechanism for the optimal control of external effects or the optimal provision of public facilities. Finally, using these concepts, the potential economic efficiency, legal feasibility, administrative tractability, political acceptability, and social desirability of implementing several innovative and, as yet, relatively untried land use control mechanisms are assessed.

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1.0 INTRODUCTION AND EXECUTIVE SUMMARY

If the characteristics of the market for real property were in complete conformity with the assumptions of perfect competition, there would exist no economic justification for the imposition of land use controls upon this market. Rather, it could reasonably be expected that the unregulated market would function in such a manner than an economically efficient pattern of development would be achieved.

Moreover, in many ways the market for real property is described satisfactorily by the assumptions of perfect competition. In general, the market embraces a large number of independent buyers and sellers, none of whom exerts any substantial control over market prices. Reasonably accurate information concerning the availability and asking prices of properties is readily available from real estate agents and classified advertisements. Finally, entry into and exit from the market is reasonably free, although transaction costs may be significant in many instances.

However, even when property is undeveloped it is not perfectly homogeneous; and after development its heterogeneity becomes even more pronounced. In addition, the real property market is subject to a high degree of interdependence. There exist among various types of land uses certain uncompensated externalities (e.g., air and water pollution, noise, congestion, aesthetic conflicts) which prevent the unrestricted market from achieving economic efficiency. Similarly, interdependencies exist between the economically efficient development of private property and the economically efficient provision of public facilities (e.g., water, sewerage, streets and highways) to serve private land use activities.

Consequently, the political process has intervened in the market for real property both to protect property owners against the potential erosion of their wealth and to promote economic efficiency in the provision of public facilities. Historically, this political intervention has consisted of the enactment and implementation of such mechanisms as municipal zoning processes, subdivision regulations, building codes, and eminent domain condemnation procedures.

Undeniably, these land use controls have had substantial impacts upon the patterns of development of real property which have been attained throughout the nation. However, because these controls have incorporated numerous unintended economic incentives, many of their impacts have, in many situations, been inconsistent with the attainment of economic efficiency.

To aid in understanding the rationality of the behavior patterns which have produced these unanticipated and, frequently, undesired impacts and to provide a conceptual basis for the establishment of improved land use controls to supplement or supplant the traditional mechanisms, this report develops a theoretical economic analysis of the incentives embodied in public regulatory policies. Then, taking into consideration the practical legal constraints which the existing body of legislation and judicial interpretations imposes upon the feasibility of implementing particular regulatory policies, the report applies this theoretical economic analysis to the evaluation of a variety of existing and proposed land use control mechanisms.

Specifically, Chapter 2.0 investigates the economic and legal relationships between the assignment of property rights in any situation and the nature and extent of the externalities which exist in that situation. This investigation demonstrates that:

- The establishment of private property rights generally produces a greater internalization of externalities than is produced by the establishment of communal property rights because, somewhat paradoxically, private property rights encourage people to take greater account of social costs.

- The market resolution of any externality situation will be both economically efficient and allocatively neutral with respect to the assignment of property rights *if* the income elasticity of demand is zero in all markets (including the market for the external effect) and *if* the costs of negotiating and enforcing transactions are zero.

- In realistic externality situations, the attainment of the socially most desirable allocation of resources will not be independent of the assignment of property rights. Rather, because of equity considerations, differences in the objectives of the various individuals involved in the situation, differences in the availability of relevant information under alternative assignments of property rights, differences in the number of individuals involved in different situations, the existence of substantial transaction costs, and differences in the transaction costs associated with alternative assignments of property rights, the social desirability of the market resolution of any realistic externality situation will be inextricably related to the assignment of property rights established in that situation.

- There exists no single assignment of property rights which uniformly constitutes the socially most desirable assignment of property rights in all externality situations. The socially most desirable assignment of property rights for any particular externality situation can only be determined on the basis of a careful evaluation of the relative strengths and weaknesses of all feasible alternative assignments of property rights in that situation.

- Neither the existing body of private nuisance law, as interpreted by the courts today, nor the prevailing judicial reconciliation of the inherent conflict between the police power of the state and the private citizen's right to just compensation for the confiscation of his property appropriately provides for the internalization of all externalities.

- The legal remedy of totally prohibiting the production of an externality (i.e., injunctive relief) generally constitutes an inefficient resolution of an externality situation, since it is incapable of distinguishing between land uses which are able to pay their total social cost and land uses which are unable to pay this cost.

Next, Chapter 3.0 examines the administrative, economic, judicial, legal, and political problems which arise in the application of traditional land use control mechanisms. This examination, which focuses primarily upon municipal zoning processes and eminent domain procedures, demonstrates that:

- Because of legal and judicial restrictions upon the application of municipal zoning controls in certain situations, structural limitations upon the effectiveness of municipal zoning, administrative difficulties in the implementation of municipal zoning processes, undesirable political influences in municipal zoning processes, and unanticipated or unintended economic problems embodied in or arising from the application of municipal zoning controls, municipal zoning is incapable, in practice, of promoting the internalization of all externalities.

- In numerous instances, the inequities and inefficiencies which result from the inappropriate application of municipal zoning controls are intensified by the simultaneous inappropriate application of complementary land use control techniques, such as subdivision regulations and building codes.

- Prevailing legal and judicial restrictions upon both the range of application of the power of eminent domain and the procedures which must be employed in performing eminent domain condemnation cause the exercise of the power of eminent domain to be incapable of promoting the economically efficient provision of public facilities in all situations.

- In addition, prevailing legal and judicial interpretations of the concept of just compensation, combined with the unavoidable reliance upon subjective judgment in the measurement of just compensation, causes the exercise of the power of eminent domain to impose severe inequities upon some individuals in some situations.

- Despite the demonstrated weaknesses of municipal zoning processes, subdivision regulations, building codes, and eminent domain condemnation procedures as mechanisms for the regulation of real property, it cannot be concluded that any or all of these land use control techniques should be abolished, replaced, or modified. Before any of these conclusions can be reached, it must be demonstrated that, in the particular externality situation under consideration, the allocation of activities to parcels of land can be performed more satisfactorily either by the unregulated market, by some other land use control mechanism, or by modified versions of the existing land use control techniques.

Chapter 4.0 identifies and describes the problems which arise in the attainment of economic efficiency and the achievement of the socially most desirable allocation of resources when externalities, public goods, or increasing returns to scale prevail in any particular market. In addition, analyses of the effectiveness of the various public policies which might be employed to resolve these problems of market failure in specific situations are performed. These analyses demonstrate that:

- There exists no single mechanism for the internalization of externalities which uniformly constitutes the socially most desirable internalization mechanism in all externality situations. Rather, for any particular externality situation, the determination of the most appropriate internalization mechanism can only be performed on the basis of a careful examination of the relative strengths and weaknesses of all feasible alternative internalization mechanisms in that situation. Thus, in different externality situations, the socially most desirable internalization mechanisms might include the voluntarily negotiated resolution of the externality situation by all affected individuals, the imposition of unilateral or bilateral taxes or subsidies, the specification of minimum standards of acceptability, the establishment of markets for the exchange of rights to produce externalities, or the merger of affected resource owners into "natural" decision-making units.

- Although charging a zero price for the consumption of a public good will promote the attainment of economic efficiency in the consumption of the good, the adoption of this policy will preclude the attainment of economic efficiency in the production of that good, in particular, and all goods and services, in general. Conversely, although charging a positive price for the consumption of a public good will necessarily restrain society from the attainment of economic efficiency in the consumption of goods and services, the adoption of this policy will provide valuable information for the determination of the economically efficient rate of production of the good. Therefore, the evaluation of the social desirability of charging any particular price for the consumption of any public good should be based on a careful comparison of the costs and benefits which will be obtained by society if that pricing policy is adopted.

- Theoretically, to promote economic efficiency in the provision of a good produced under conditions of increasing returns to scale, the price of the good should be set equal to the marginal cost of producing the good and, then, the operating losses of the producer of the good should be financed through a system of lump sum taxes. However, in realistic situations, the unavailability of relevant information and the absence of appropriate taxation mechanisms may cause the charging of a price equal to the average cost of producing the good or the adoption of a multipart pricing system to be socially more desirable than the theoretically optimal pricing and taxation mechanism. In each situation, it is necessary to compare the relative advantages and disadvantages of all potentially applicable policies before selecting any specific policy for implementation.

- Although there exists no single public policy which is uniformly socially most desirable for the control of any of the preceding types of market failure, there does exist a single analytical framework which is universally appropriate for the comparison of the strengths and weaknesses of alternative policies -- the analytical framework of cost-benefit analysis.

Finally, Chapter 5.0 investigates the possibility that some alternative regulatory policies might be capable of producing patterns of development which are socially more desirable than the patterns of development which are produced by the traditional regulatory mechanisms of municipal zoning, subdivision regulation, building codes, and eminent domain condemnation. Specifically, for each of seven innovative and, as yet, relative untried regulatory policies, this investigation examines the information requirements and information retrieval considerations associated with the policy; the potential inequities, abuses, and enforcement problems which are likely to arise with the policy; the legal constraints and political considerations which might limit the applicability of the policy; the expected impact of the policy on land use patterns; the extent to which the policy promotes the attainment of the socially most desirable pattern of development; and the most appropriate level of government to implement the policy. The policies which are examined include: a policy of ad valorem property taxation with tax rates conditional upon land use, a policy requiring the payment of annual "externality" fees to the government by the owners of property upon which external effects are generated, a policy providing for the transfer of a lump-sum payment for externalities whenever the permissible land use status of any property is changed; a policy of convening public hearings to promote negotiated settlements of externality problems among all individuals who are affected by these problems; a policy of purchasing scenic or environmental easements; a policy encouraging the formation of landowner development corporations; and a policy requiring the owners of new developments to pay the full additional cost of all expansions of public facilities which must be provided to serve these new developments. Relative to these policies, the investigation demonstrates that:

- The implementation of a policy of ad valorem property taxation with tax rates conditional upon land use generally will be socially undesirable because any realistic policy of this type can be expected in many instances to provide perverse incentives to property owners and, consequently, in most situations to produce patterns of development which are less satisfactory than the patterns of development which would have been produced by alternative policies.

- It generally will be socially undesirable to implement a policy requiring the transfer of lump-sum payments for externalities prior to changes in the permissible land use status of properties because of the extreme volume of information required for the formulation of a policy of this type, the substantial practical and theoretical difficulty associated with assembling this body of information, and the limited opportunity to adjust the structure of payments embodied in this policies in response to initial errors in the specification of payments or changes in the characteristics of externality situations.

- Public hearings involving all individuals who are affected by particular externalities are likely to be successful in promoting negotiated settlements of these externality problems only in situations which involve only a small number of individuals -- situations in which private negotiations are also reasonably likely to produce mutually agreeable settlements without governmental intervention. However, in externality situations involving large numbers of individuals, it is extremely likely either that no negotiated settlement will be attained or, if less than the unanimous consent of all affected individuals is required for the adoption of a settlement, that the pattern of development which is attained will be less socially desirable than the patterns of development which would have been produced by alternative policies.

- The adoption of a policy encouraging the formation of landowner development corporations will virtually inevitably be socially undesirable because the formation of a landowner development corporation which is sufficiently comprehensive to control effectively the externalities which arise among private land uses in a geographic area necessarily will provide to the shareholders of this corporation substantial monopoly control over the development and use of land in this area. Regulation of the corporation's exploitation of this monopoly power will be at least as difficult as the direct regulation of the externality situation using an alternative control policy.

- Both the imposition of annual "externality" fees and the public purchase of scenic and environmental easements offer sufficient flexibility in their tax and subsidy structures at any point in time and sufficient adaptability of these structures over time to present the possibility that the implementation of these policies will produce increases in the social desirability of the pattern of development in a geographic area which are large enough to justify incurring the costs of developing and implementing these policies.

- A policy which attempts to require the owners of new developments to pay the full additional cost of all expansions of public facilities which must be provided to serve their developments should cause these property owners to bear a sufficiently larger portion of this full additional cost than they bear under the prevailing methods of financing the provision of expansions of public facilities to produce an improvement in the pattern of development in a geographic area which is sufficiently great to justify incurring the costs of formulating and implementing this pricing policy.

Nevertheless, before any unqualified recommendation can be advanced concerning the social desirability of adopting any of these policies, additional research must be performed to evaluate the precise administrative requirements, political acceptability, and information processing needs of each of the policies.

Chapter 6.0 contains an extensive bibliography of the literature relevant to the issues addressed in this report.

2.0 THE RELATIONSHIPS BETWEEN PROPERTY RIGHTS AND EXTERNALITIES

Externalities arise when the production or consumption opportunities of individual members of society are directly affected by the resource allocation decisions of other members of society or, stated somewhat differently, when the exercising of acknowledged property rights by some individual members of society directly affects the profits or satisfaction which can be obtained by other members of society from the exercising of their acknowledged property rights. Thus, in virtually any realistic externality situation, a clear relationship will exist between the assignment of property rights which is established in this situation and the nature and extent of the externalities which prevail in the situation.

This chapter investigates the structure of this relationship. Specifically, Section 2.1 analyzes the economic aspects of the relationship between property rights and externalities; while Section 2.2 examines the prevailing and emerging judicial interpretations of the legal aspects of this relationship. Finally, Section 2.3 presents some general conclusions concerning the implications of these economic and legal analyses for the development of public policies for the control of externalities.

2.1 Economic Relationships Between Property Rights and Externalities

While economists traditionally have visualized the market mechanism as a process in which goods or services are exchanged by individuals, a more accurate representation of this mechanism would recognize that the items which actually are exchanged in the market are the rights to the possession and use of these goods and services. Thus, a market transaction essentially consists of an exchange of two bundles of property rights; and the value which is attached to any good whose ownership is modified by a market transaction depends crucially on the particular bundle of property rights to the possession and use of that good which is conveyed in that transaction.

In adopting this representation of the market exchange process, it is important to recognize that:

> "...property rights do not refer to relations between men and things, but, rather, to the sanctioned behavioral relations among men that arise from the existence of things and pertain to their use. Property rights assignments specify the norms of behavior with respect to things that each and every person must observe in his interactions with other persons, or bear the cost for nonobservance. The prevailing system of property rights in the community can be described, then, as the set of economic and social relations defining the position of each individual with respect to the utilization of scarce resources."*

To obtain a thorough appreciation of the practical significance of the distinctions which are drawn in this definition, it is useful to consider the implications for resource allocation of two polar forms of property right ownership: communal ownership and private ownership. Under communal ownership, "...the community denies to the state or to individual citizens the right to interfere with any person's exercise of communally-owned rights;" while, under private ownership, "...the community recognizes the right of the owner to exclude others from exercising the owner's private rights."**

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*Furubotn and Pejovich (43), p. 1139. An essentially identical although less formal, definition of property rights appears in Demsetz (38), p. 347, where it is stated: "Property rights are an instrument of society and derive their significance from the fact that they help a man form those expectations which he can reasonably hold in his dealings with others.... An owner of property rights possesses the consent of fellowmen to allow him to act in particular ways. An owner expects the community to prevent others from interfering with his actions, provided that these actions are not prohibited in the specification of his rights.... It is clear, then, that property rights specify how persons may be benefited and harmed, and, therefore, who must pay whom to modify the actions taken by persons."

**Demsetz (38), p. 354. In this article, Demsetz also distinguishes a third basic form of ownership: state ownership. Under state ownership, "...the state may exclude anyone from the use of a right as long as the state follows accepted political procedures for determining who may not use state property." Detailed consideration of the resource allocation implications of this form of ownership will contribute very little to the analytical content of this report and, consequently, will not be pursued here.

2.1.1 The Resource Allocation Implications of Communal Ownership*

If a particular resource is communally owned, every member of the community possesses the right to use the resource. If a person refrains from exercising his right in any time period, the benefits attributable to this action in the form of an increased availability or productivity of the resource in future time periods do not accrue exclusively to that person, but, rather, accrue to all members of the community. Conversely, if a person attempts to maximize the value of his communal rights by utilizing the resource extensively in any time period, the costs associated with this action in the form of a decreased availability or productivity of the resource in future time periods are not incurred exclusively by that person but, rather, are incurred by all members of the community. Consequently, communal ownership encourages excessive utilization of a resource because this form of ownership fails to concentrate upon each person the costs, or benefits, which are associated with his exercising, or refraining from exercising, his communal rights.

In addition, to the extent that a communally-owned resource can be employed as an input into various production processes, the communal ownership of one resource can have substantial impacts upon the utilization of other privately-owned resources. Thus, the absence of exclusive rights to the use of a communally-owned resource will increase the cost of policing (i.e., detecting and capturing) the income which is generated by the privately-owned resources which are used in combination with the communally-owned resource. This increased policing cost will motivate users of the communally-owned resource to prefer to produce products whose physical attributes entail relatively low costs of policing the income generated by private investment inputs. For example, users of communally-owned land might choose to raise cattle rather than to plant potentially more lucrative corn merely because the cost of policing investment in corn, which is physically attached to the common land, is greater than the cost of policing investment in cattle, which can be driven home at night.

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*The material presented in this section has been abstracted from the following sources: Cheung (17), pp. 52-64; Demsetz (35), p. 17; Demsetz (36), p. 13; and Demsetz (38), pp. 354-355.

This change in the type of product which users of a particular resource choose to produce when the resource is communally-owned rather than privately-owned necessarily is associated with a change in the composition of private investment inputs, although it is impossible to determine a priori whether the total value of private investment will increase or decrease. Nevertheless, it is certain that, for any degree of competition, the economic rent of a resource will dissipate more rapidly when that resource is communally-owned than when it is privately-owned, since private ownership will induce the choice of that product whose production will maximize the economic rent of the resource.

Although this discussion of the implications of communal ownership for resource allocation is far from exhaustive, it clearly demonstrates that this form of ownership creates situations in which externalities abound. Thus, the production and consumption opportunities of individual members of the community are directly affected by the resource allocation decisions of other members of the community -- decisions over which the externally affected individuals have no control. Moreover, these external effects are not attributable to the changes in the equilibrium set of market prices which occur as the economy adjusts to changes in supply and demand conditions. Finally, these modifications of production and consumption opportunities do not arise from the performance of malicious actions by the other community members, but are produced only incidentally by these individuals in their pursuit of legitimate activities.

While these externalities conceivably can be mitigated if all members of the community mutually agree to restrict the exercising of their rights to the communally-owned resource and, hence, to curtail the rate at which each of them utilizes this resource, the negotiation and maintenance of an agreement of this type is extremely unlikely. Since each individual who declines to agree to restrict his use of the resource has the right to utilize the resource as intensively as he desires, there is little incentive for any member of the community to enter into a mutual accord. This inclination is reinforced by the knowledge that, if any group of individuals within the community does agree to limit their use of the resource, all of the cost associated with their foregone present utilization of the resource is incurred by the members of this group; while most, if not all, of the benefits associated with the increased present and future availability of the resource accrues to those members of the community who have not joined in the agreement.* Similarly, since these same motivations will continue to prevail in the unlikely event that a mutual agreement of all members of the community is successfully negotiated, the maintenance of this agreement will require the allocation of a substantial portion of the community's resources to the enforcement of its stipulations. Finally, communal ownership provides no plausible mechanism through which the total expected benefits and the total expected costs which can accrue to future generations from their use of the communally-owned resource will be appropriately incorporated into the decision-making processes of the present users of the resource. Consequently, the occurrence of widespread intragenerational and intergenerational externalities appears to be virtually unavoidable under a regime of unconstrained communal ownership of resources.

2.1.2 The Resource Allocation Implications of Private Ownership**

If a particular resource is privately owned, the individual who owns the resource has control over the manner in which it is utilized.*** Thus, before any other individual or group of individuals may affect the use of the resource, that individual or group of individuals must obtain the prior consent of the resource's owner, who is permitted to sell or transfer his right to control its use at his discretion. Consequently, in a society which relies exclusively upon the private ownership of resources, the public sector is required to perform only two functions. First, the government must determine which individual possesses the right to control the use of each of the society's scarce resources and hence, which individual may assert that his rights have been affected by others in any controversial situation. Second, the government must utilize the police power of the state to protect the rights which it has assigned or it must permit the owners of these rights to protect their rights by themselves.

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*Although it is conceivable that the members of the cooperative group will enjoy some increase in their utilization of the resource in future time periods; even if this result occurs, their increased future utilization of the resource will not exceed the increased future utilization of the resource which is obtained by those members of the community who have declined to join the group. Thus, each group member can obtain virtually the same future utilization of the resource and an increased present utilization of the resource if he individually withdraws from the group.

**The material presented in this section has been abstracted from Cheung (17), pp. 50-51 and p. 67; Demsetz (37), p. 62; and Demsetz (38), pp. 355-358, unless it is specifically attributed to another source.

***Furubotn and Pejovich (43), p. 1140, qualify this statement by pointing out that although the right of private ownership is an exclusive right, it is not an unrestricted right. Rather, the right of private ownership is exclusive "...in the sense that it is limited _only_ by those restrictions that are explicitly stated in the law as it is interpreted from time to time."

If all of these conditions are satisfied, it becomes feasible for each resource owner to attempt to maximize his wealth by selecting from the set of alternative utilization patterns for his resources that utilization pattern which he believes will generate a future time stream of benefits and costs which will maximize the present value of his rights of private ownership. Since this maximal present value represents the amount of income which the resource owner expects to be able to receive in the market in exchange for his rights to use these resources and since this present value is partially determined by benefits and costs which are expected to accrue to these resources after the death of the resource owner, it is rational for each resource owner to attempt to incorporate into his current resource utilization decisions the supply and demand conditions which he expects to exist in future generations. Essentially, the resource owner acts as a broker whose wealth depends upon his effectiveness in reconciling the competing demands of present and future generations. In this manner, many of the intergenerational externalities which almost certainly will exist under a regime of communal ownership are internalized automatically under a regime of private ownership.

Similarly, the private ownership of resources promotes the internalization of many of the intragenerational externalities which normally arise under communal ownership. Since under private ownership each resource owner is permitted to exclude other individuals from the use of his resources, he generally is assured of securing the rewards which are generated by his allocation of these resources. This concentration upon the owner of a resource of the benefits and costs which are produced by his utilization of the resource provides substantial incentives to use resources more efficiently.

Yet, the assignment of private rights to control the use of resources does not necessarily produce the internalization of all externalities. Since the owner of the private rights to control the use of one set of resources cannot exclude other individuals from the use of resources which are owned by those other individuals, he has no direct incentive, in the absence of negotiations, to incorporate into his resource utilization decisions any consideration of the external effects which his utilization of his resources imposes upon the private rights of other individuals. Thus, even under private ownership, many externalities are expected to arise.

However, an externality which does arise under the private ownership of resources seldom affects all of the resource owners in the society. Consequently, in general, the internalization of an externality merely requires that an agreement which appropriately accounts for this external effect must be entered into and maintained by only a few resource owners. Hence, the cost of negotiating and policing the internalization of externalities is considerably lower under private ownership than it would be if resources were communally owned. Thus, somewhat paradoxically "... it can be seen that private rights can be socially useful precisely because they encourage persons to take account of social costs."* In fact, Demsetz has advanced the hypothesis that the development of new private property rights occurs for precisely this reason.**

The negotiated internalization of an externality can be accomplished through the application of either of two basic techniques: the establishment by all of the relevant resource owners of a contractual agreement which precisely stipulates the method of reconciling the external effects at issue or the outright purchase by some of the relevant resource owners of the private rights of the remaining relevant resource owners (i.e., the merger of the private rights of all of the relevant resource owners). If there are no economies or diseconomies of scale associated with the ownership of different sized bundles of rights and if only a single, readily enforceable contractual agreement is required to internalize the externality, there is no comparative advantage to the selection of either internalization technique. However, if there are multiple externalities which require the negotiation of several contractual agreements or if contractual agreements are difficult to enforce, merger will tend to be the preferred internalization technique. Conversely, if there are substantial diseconomies of scale associated with the ownership of bundles of rights, interacting resource owners will be more likely to adopt contractual agreement as the preferred internalization technique. Thus, in general, the costs of negotiating and enforcing contractual agreements will be compared with those costs which depend upon the scale of ownership; bundles of rights will tend to be accumulated in sizes which minimize the sum of these costs; and contractual agreements to internalize the remaining external effects will tend to be arranged by the owners of these optimal sized bundles of rights.

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*Alchian and Demsetz (1), p. 24.

**Demsetz asserts that "...property rights develop to internalize externalities when the gains from internalization become larger than the cost of internalization. Increased internalization, in the main, results from changes in economic values, changes which stem from the development of new technology and the opening of new markets, changes to which old property rights are poorly attuned," Demsetz (38), p. 350.

Nevertheless, despite these extensive opportunities for the internalization of externalities without governmental intervention when resources are privately owned, it is virtually inevitable that some external effects will escape voluntary internalization under a regime of private ownership. In particular, if a certain external effect impinges upon a large number of resource owners, the control of the activity which produces this external effect assumes the properties of a public good. It becomes rational for each resource owner who is externally affected by this activity to adopt the role of a "free rider" and to understate his willingness to pay for the optimal control of the activity. Since it is individually rational for each externally affected resource owner to behave in this fashion, the unavoidable consequence is the insufficient control of the externality-producing activity. Thus, in this situation, it is anticipated that an activity which generates external diseconomies will be pursued with excessive intensity; while an activity which creates external economies will be pursued with insufficient intensity. Consequently, even with private ownership of resources, it is extremely unlikely that the voluntary actions of resource owners will produce the internalization of all externalities. The obvious question which remains is: What action, if any, should be taken by the government to promote or require the internalization of these remaining externalities?

2.1.3 The Traditional Solution

The traditional solution to the problem of internalizing these remaining externalities has its origins in the writings of Pigou (85).

Pigou asserts that an economically efficient allocation of resources is attained by a society when its national dividend is maximized. Moreover, the national dividend will be maximized when the private marginal net product is equal to the social marginal net product in all uses. Thus, inefficiency exists in every activity in which this equality is not satisfied. To eliminate this inefficiency, Pigou proposes the provision of incentives which will induce those firms which are generating externalities to produce those levels of output which will maximize the national dividend.

More specifically, Pigou recommends the development of a system of taxes and subsidies which will modify the cost function of an externality-producing firm in a manner which will cause the firm's profit-maximizing output level to correspond to the socially optimal output level. This recommendation generally has been interpreted as a proposal that the price of the output of the firm should be modified to reflect more accurately the social marginal net product through the imposition of specific (per unit) excise taxes and subsidies upon this output. Thus, if the firm is generating an external diseconomy, a specific excise tax should be imposed to induce a reduction in output; while, if the firm is creating an external economy, a specific excise subsidy should be provided to motivate an increase in production.

Although this proposal does require that the calculation of the optimal taxes and subsidies must be performed by the government, it also permits all production decisions to be made by the individual firms. Therefore, this traditional solution to the problem of internalizing externalities maintains a substantially higher degree of decentralization of decision-making than most alternative public policies, such as the imposition of a system of standards or the legal prohibition of the generation of external effects.

2.1.4 The Coase Theorem

The traditional Pigouvian solution to the externality problem has been generally accepted by economists as the appropriate remedy for this problem from the time of its initial publication until 1960, when it has been seriously challenged by Coase (19). This challenge begins with the assertion that the traditional Pigouvian policy of imposing unilateral taxes and subsidies upon externality-generating firms is inappropriate because the adequate assessment of all of the social costs which are attributable to externalities requires a recognition of the reciprocal nature of any externality situation. Specifically, Coase declares:

> "The traditional approach has tended to obscure the nature of the choice that has to be made. The question is commonly thought of as one in which A inflicts harm on B and what has to be decided is: how should we restrain A? But this is wrong. We are dealing with a problem of a reciprocal nature. To avoid the harm to B would inflict harm on A. The real question that has to be decided is: should A be allowed to harm B or should B be allowed to harm A? The problem is to avoid the more serious harm."*

Thus, in any externality situation, the external effect is caused by both the resource owner who generates the effect and the resource owner who receives it. Consequently, if the optimal allocation of resources is to be attained, it is desirable that both of these resource owners should take account of the external effect in making their resource allocation decisions. In principle, this objective can be attained if an individual who desires to modify the behavior of another individual who is generating an externality engages in trade with that other individual which moves both of them to preferred positions where no additional mutually agreeable trades are available and, hence, Pareto optimal equilibrium prevails. The significance of this principle for public policy has been developed by Buchanan and Stubblebine; who conclude:

> "The important implication to be drawn is that full Pareto equilibrium can never be attained via the imposition of unilaterally imposed taxes and subsidies until all marginal externalities are eliminated. If a tax-subsidy method, rather than "trade" is to be introduced, it should involve bi-lateral taxes (subsidies). Not only must B's behavior be modified so as to insure that he will take the costs externally imposed on A into account, but A's behavior must be modified so as to insure that he will take the costs "internally" imposed on B into account. In such a double tax-subsidy scheme, the necessary Pareto conditions would be readily satisfied."**

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*Coase (19), pp. 1-2.

*Buchanan and Stubblebine (15), p. 383.

Having demonstrated this reciprocal nature of any externality situation, Coase uses this result to investigate the implications for resource allocation of different assignments of property rights in externality situations. This investigation concludes that, in the absence of any costs of negotiating and enforcing transactions, if property rights with respect to liability for the damages caused by an externality are clearly specified, transferable,* and rigidly enforced, any particular liability rule will produce an economically efficient allocation of resources. Specifically, when these conditions are satisfied, the stipulated liability rule will provide an incentive to one of the two parties who are involved in the externality situation to attempt to change the extent to which external effects are generated by offering inducements to the other party to modify his behavior. Thus, at the extremes, if the resource owner who produces an external effect is declared to be completely liable for the damages caused by this external effect, he will be motivated to pay an indemnity to the resource owner who receives the external effect to secure that resource owner's acquiescence to the production of additional output; while, conversely, if the resource owner who produces an external effect is declared to have no liability for the damages caused by this external effect, the resource owner who receives the external effect will be motivated to pay a bribe to the externality-producing resource owner to induce that resource owner to reduce his production. In either case, whenever the resource owner who produces the external effect decides to increase his production, he incurs a cost in the form of either an increased indemnity payment to or a foregone bribe payment from the resource owner who receives the effect. Similarly, whenever the resource owner who receives the external effect decides to decrease the extent to which he absorbs this effect, he incurs a cost in the form of either a foregone indemnity payment from or an increased bribe payment to the resource owner who produces the effect. Consequently, whenever either of these parties makes his resource allocation decisions, he appropriately incorporates the full social cost of his activities into his decision-making process. The inevitable result of this procedure is the attainment of an economically efficient allocation of resources.

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*Property rights with respect to liability for damages are transferable if the government enforces liability rules only upon appeal by one of the parties who are involved in the externality situation. This enforcement policy introduces the possibility of exchange between these parties.

Finally, Coase asserts that since the marginal cost associated with any particular increase in the production of an external effect is unaffected by the assignment of different liability rules, the same economically efficient allocation of resources will be attained regardless of the liability rule which is adopted, so long as the differences in the distributions of wealth which are associated with the various liability rules have no affect upon demand patterns. Thus, in summary, the Coase Theorem states that _if_ the income elasticity of demand is zero in all markets (including the market for the external effect) and _if_ the costs of negotiating and enforcing transactions are zero, the market resolution of any externality problem will be both economically efficient and allocatively neutral with respect to the assignment of liability.

Moreover, while Coase establishes the validity of this conclusion only for those assignments of property rights under which the resolution of an externality problem requires the unanimous consent of all of the resource owners who are involved in this problem through the negotiation of a mutually acceptable agreement, Buchanan demonstrates that, under the assumptions embodied in the derivation of the Coase Theorem, economic efficiency and allocative neutrality will be produced under a much broader range of property rights structures.* Thus, Buchanan proves that the same allocation of resources which is observed at equilibrium under the property rights structures analyzed by Coase will also be produced by a collective decision process which requires the unanimous consent of all members of the community to any change in the allocation of resources, a collective decision process which will perform a reallocation of resource with less than the unanimous consent of all members of the community (i.e., with the consent of a simple majority of the members of the community), or an administrative decision process in which the decision-maker maximizes the potential rent of his right to make the final resource allocation decision for the entire community. Moreover, Buchanan's proof of the applicability of the Coase Theorem under these additional structures of property rights relies merely on the same equilibrating mechanism hypothesized by Coase -- the transfer of income from resource owners who are adversely affected by a decision to at least some of the individuals who have control over the decision. For example, under an administrative decision process, the decision-maker can be induced to maximize the potential rent of his right to make a decision if he is permitted to collect and retain this rent in the form of personal side payments. Consequently, it appears that the conclusions of Coase's analysis will be valid for an extremely broad range of property rights structures.

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*Buchanan (12), pp. 587-590.

However, subsequent researchers* have observed that several important assumptions which Coase has employed in his analysis are never stated explicitly in his discussion of this analysis. In particular, Coase implicitly has assumed that (1) the use of financial capital is a free good and, hence, is readily available to all resource owners for the payment of indemnities and bribes, (2) information concerning both current and future opportunities is perfect, and (3) perfect competition exists in all of the economic sectors which are involved in the externality situation. Obviously, these additional assumptions impose substantial restrictions upon the number of situations in which the Coase Theorem can be applied without qualification.

Moreover, and not surprisingly considering the profound impact which Coase's analysis has had upon the prevailing attitude of economists toward the appropriate treatment of externality situations, the preceding qualifications of the range of applicability of the Coase Theorem constitute relatively minor elements in the controversy which has developed in response to the publication of Coase's seminal article. Therefore, the remainder of this section is devoted to the explanation and reconciliation of the other aspects of this controversy.

2.1.5 Equity Considerations

Recognition of the reciprocal nature of externality leads reasonably directly to the conclusion that, in any particular externality situation, the same economically efficient allocation of resources will be attained regardless of the liability rule which is adopted. However, Mishan,** Randall,*** and Wellisz**** emphasize that this demonstration of the allocative neutrality of different liability rules does not constitute a demonstration of the ethical neutrality of these different rules. That is, the realization that, in a particular externality situation, the same composition of output will result if either the resource owner who produces the externality is required to pay an indemnity to the resource owner who receives it or the resource owner who receives the externality is required to pay a bribe to the resource owner who produces it does not necessarily imply that these two assignments of liability are equally socially desirable. Thus, for example, it appears unlikely that any reasonable society would consider to be socially acceptable either a liability rule which requires the victims of crime to bribe criminals to desist from their criminal activity or a liability rule which judges that little children hit automobiles in pedestrian crosswalks. Rather than being indifferent among various assignments of liability because of their demonstrated allocative neutrality, society may exhibit substantial differences in their preferences for these various liability rules for moral and ethical reasons.

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*See, for example, Randall (88), p. 44, and Samuels (97), p. 25.

**Mishan (77), pp. 78-81.

***Randall (88), p. 53.

****Wellisz (115), p. 353.

Moreover, although the composition of output is independent of the assignment of liability in externality situations, the distribution of wealth is directly affected by the particular liability rule which is adopted. If the resource owner who produces an externality is declared not to be liable for the damages attributable to this external effect, his wealth will be greater than it would have been if he had been declared to be liable for these damages. Conversely, the wealth of the resource owner who receives the externality will be lower under the former liability rule than it will be under the latter. Consequently, citing the case of industrial pollution which affects neighboring resource owners, Randall* contends that because the owners of the industry which emits this pollution are likely to be more wealthy than the recipients of the pollution, a society which prefers a more nearly equal distribution of wealth would prefer, in this situation, the adoption of a structure of property rights which assigns liability for the damages caused by this pollution to the emitters of the pollution. Mishan** extends this argument by asserting that it may be generally desirable to assign liability for the damages attributable to a particular externality to the wealthier resource owner involved in that externality situation, because wealthy people have greater opportunities to take actions to avoid the adverse effects of any externality. Thus, the wealthy can move away from a polluted area; while the poor have less opportunity to change their locations. The implications of various liability rules for the distribution of wealth may be extremely important in determining their relative social desirability.

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*Randall (88), p. 41.

**Mishan (77), pp. 77-78.

2.1.6 Allocative Neutrality and the Distribution of Income

Coase's derivation of the allocative neutrality of alternative liability rules relies crucially upon the assumption that the amount of income which a resource owner is willing to pay to avoid incurring a particular damage is identical to the amount of income which that resource owner would be willing to accept as compensation for agreeing to incur that damage. If, as Coase's analysis assumes, all of the resource owners who are involved in the externality situation are business firms, this assumption is unobjectionable since both of these amounts of income will be equal to the incremental profit which the firm earns when this damage is avoided, which is independent of the firm's total profit level. However, if some of the resource owners who are involved in the externality situation are merely consumers, the identity of these two amounts of income will not necessarily exist for these individuals. As Dolbear* and Mishan** have demonstrated, if an individual's demand for a good increases as his income increases, the maximum amount of income which this individual is willing to pay for any given amount of the good or, alternatively, the minimum amount of income which he is willing to accept for foregoing this amount of the good will increase as his income increases. This proposition implies that, *ceteris paribus*, the maximum amount of income which the individual will pay for a unit of the good when he does not own this unit is generally less than the minimum amount of income that he will accept in exchange for this unit of the good when he does own it. Finally, this result leads to the crucial implication that different liability rules will produce different marginal valuations of externalities by consumers which, in turn, will result in different economically efficient allocations of resources at equilibrium.

Samuels*** and Weld**** lend further support to this conclusion by challenging the empirical validity of Coase's assumption that the income elasticity of demand for all goods is zero. If this assumption is not satisfied -- as it invariably will not be in actual externality situations -- the different distributions of income which result from different liability rules will generate different patterns of demand for goods which, in turn, will determine different economically efficient allocations of resources at equilibrium. Thus, in summary, the existence of consumers as resource owners in particular externality situations disaffirms the allocative neutrality of alternative liability rules in those situations.

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*Dolbear (39), pp. 95-97 and p. 102.

**Mishan (77), pp. 61-66 and pp. 83-84.

***Samuels (97), pp. 6-12.

****Weld (114), p. 609.

Even accepting Coase's implicit assumption that all of the resource owners who are involved in externality situations are profit-maximizing business firms, several researchers have questioned the allocative neutrality of alternative liability rules in the long run on the basis of the different distributions of income which evolve under the various liability rules.* Specifically, these researchers have asserted that if the initial situation of the economy is one of long run perfectly competitive equilibrium in which those resource owners who produce externalities are not liable for the damages attributable to these externalities and if the society then adopts a new structure of property rights which declares that these externality-producing resource owners are liable for these damages, this modification of the prevailing liability rule will induce a change in the distribution of income which will result in the earning of negative profits by the resource owners who produce externalities and the earning of positive profits by the resource owners who receive externalities. In the long run, this profit disequilibrium will induce the allocation of additional resources to the activities controlled by the resource owners who receive externalities and the exit of resources from the activities managed by the resource owners who produce externalities. Thus, in the long run, the allocation of resources will be affected by the assignment of different liability rules.

Nutter** disputes this conclusion by demonstrating that this reallocation of resources will not occur in response to a modification of liability rules if each resource owner in an externality situation owns some non-transferable resources on which he earns sufficient Ricardian rent when he is not liable for the damages attributable to the externality that he will be able to pay for these damages without causing this rent to become negative when he is liable for damages. Moreover, Nutter contends that this situation generally will exist because "...a combination of activities generating a nuisance will not be introduced into a perfectly competitive economy unless that combination yields at least as large a net value of output as any other uses of the same resources would yield."*

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*See, for example, Bramhall and Mills (9); Regan (90), p. 432; and Wellisz (115), p. 350.

**Nutter (82). This position is also acknowledged by Wellisz (37), p. 351.

Calabresi presents a more inclusive defense of the existence of allocative neutrality in the long run when he asserts that "...the same type of transactions which cured the short run misallocation would also occur to cure the long-run ones."** In particular, he contends that, under the assumptions of Coase's analysis (including the assumption that changes in the distribution of wealth have no effect on demand patterns), the resource owners who have gained wealth as a result of the modification of liability rules will be dissatisfied with the new allocation of resources and, hence, will bribe the resource owners who have lost wealth because of this restructuring of property rights to increase their production. This bribery process will continue until the initial allocation of resources is reestablished.

While this controversy concerning the allocative neutrality of alternative liability rules in the long-run has produced several intriguing theoretical arguments, it is important to remember that all of these arguments are based on the unrealistic assumption that all resource owners who are involved in any externality situation are profit-maximizing business firms. Consequently, the conclusions advocated in this controversy are of limited practical usefulness.

2.1.7 Allocative Neutrality and the Symmetry of Liability Rules

The demonstration of the allocative neutrality of alternative liability rules directly implies that both the policy of discouraging increases in the production of an externality through the imposition upon the producer of this externality of a charge equal to the value of the damages attributable to the externality and the policy of encouraging reductions in the production of the externality through the offering by the recipients of the externality to its producer of a bribe equal to the value of the damages avoided are symmetric methods of internalizing the externality. However, considerable doubt has been cast upon the validity of this implication in the economic literature.

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*Nutter (82), p. 507.

**Calabresi (16), p. 67.

The most frequently asserted justification* for the contention that bribes and charges are asymmetric methods of internalizing externalities is based upon the recognition that the determination of the appropriate magnitude of either a bribe or a charge requires the comparison of the actual level at which an externality is produced to a specified base level of production of that externality. Although the development of an economically efficient charge mechanism is not difficult since no production of the externality constitutes an effective specified base level for a charge mechanism, the development of an economically efficient bribe mechanism is likely to be substantially more difficult. The specified base level of externality production for a bribe mechanism must be at least as great as the level which the producer of the externality would choose to produce in the absence of any internalization of the externality. To guarantee that this condition will be satisfied, the recipients of the externality (or, alternatively, the administrative authority which is responsible for the implementation of the bribe mechanism) must have complete knowledge of the cost constraints and revenue opportunities which confront the producer of the externality. While it is conceivable that an acceptable specified base level for a bribe mechanism might be determined initially, it is unlikely that this base level will be maintained at an effective level as the market conditions facing the externality producer change over time. If, at any time, the cost and revenue conditions confronting the producer of the externality cause his profit-maximizing production level to exceed the specified base level, the bribe mechanism will cease to be effective in inducing the internalization of the externality. Once again, to assure that the specified base level will be adjusted appropriately to avoid this outcome, it is required that the recipients of the externality must have complete knowledge of the profit opportunities of the externality producer. Since the likelihood that this condition will be satisfied is extremely low, the symmetry of bribes and charges is very unlikely to prevail.

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*This justification appears in Dolbear (39), pp. 100-101 and p. 103; Kamien, Schwartz, and Dolbear (53); Mumey (79); and Tybout (110), pp. 261-262.

Mumey* extends this argument by asserting that, with a bribe mechanism, it is conceivable that the producer of an externality will attempt to extract excessive bribes from the recipients of the externality by threatening to produce the externality at a level which exceeds the level at which he would choose to produce it in the absence of any internalization. If this strategy is generally adopted by the producers of externalities, the essentially coercive redistribution of income which will evolve from its application will have a noticeable impact upon the composition of the society's output unless the income elasticity of demand for all goods is zero.

A different and possibly more damaging criticism of the assertion that bribes and charges are symmetric methods of internalizing externalities is developed by Marchand and Russell (66), who demonstrate that these two techniques will produce the same economically efficient allocation of resources only if the cost functions of the recipients of the externality are separable (i.e., if the magnitude of the external cost which is imposed on each recipient by the externality is independent of the level of output which is produced by the recipient).** However, if the cost functions of the recipients are non-separable (i.e., if the magnitude of the external cost attributable to the externality is affected by the output decisions of the recipients), neither a bribe nor a charge will generate the optimal allocation of resources which evolves when both the producers and the recipients of the externality cooperate in the maximization of their joint profits. Instead, the adoption of a bribe mechanism will result in the production of an inefficiently high level of output by the producers of the externality and an inefficiently low level of production by the recipients of the externality. Conversely, the introduction of a charge mechanism will induce the production of an inefficiently low level of output by the producers of the externality and an inefficiently high level of production by the recipients of the externality.

Gifford and Stone (45) assert that all of the preceding refutations of the symmetry of bribes and charges can be circumvented by developing bribe or charge mechanisms which compare the level of profits which the recipients of the externality will earn if the production of the externality is modified with a specified base level of the recipients' profits. Not surprisingly, the level of profits which accrue to the recipients when the externality is not produced constitutes an acceptable specified base level of profits for a charge mechanism; while the level of profits which accrue to the recipients when no internalization of the externality is undertaken constitutes an acceptable specified base level of profits for a bribe mechanism. However, it is important to recognize that the determination of these specified base profit levels requires not only complete knowledge of the cost and revenue conditions which confront the producers of the externality, but also complete knowledge of the profit opportunities which are available to the recipients of the externality. Since these information requirements are substantially more stringent than the information requirements of the standard bribe and charge mechanisms, it is even less likely that these new requirements will be satisfied in either a static or a dynamic context. Consequently, it appears reasonable to assert that, in general, asymmetry will exist between bribes and charges as mechanisms for the internalization of externalities.

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*Mumey (79), pp. 722-723.

*Formally, a cost function $C(q_1, q_2)$ is separable if it can be expressed in the form: $C(q_1, q_2) = C^1(q_1) + C^2(q_2)$.

2.1.8 The Need for Bi-Lateral Payments

As has been asserted previously, the recognition of the reciprocal nature of externality implies that the imposition of unilateral taxes or subsidies constitutes an ineffective technique for internalizing externalities. Specifically, it has been contended that if a community adopts a charge mechanism under which the recipients of an externality are not paid compensation for the externality which they receive at equilibrium, they will fail to recognize the full social cost associated with the imposition of more stringent restrictions upon the production of the externality and, hence, will be motivated to seek the adoption of these additional, inefficient restrictions. Consequently, to preclude this possibility, the imposition of bi-lateral taxes and subsidies has been recommended as the universally appropriate technique for the internalization of externalities.*

However, the implementation of this recommendation clearly is substantially more difficult than the implementation of the traditional Pigouvian solution. As explained by Regan:

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*This recommendation is proposed explicitly in Buchanan (13), p. 447; Buchanan and Stubblebine (15), p. 383; and Furubotn and Pejovich (43), p. 1142.

> "The reciprocal nature of most externalities means that Pigou considerably underestimated the difficulty of finding regulatory (tax-subsidy) schemes which would guarantee internalization. . . . In general, to set up an appropriate tax-subsidy scheme might require as much information on the part of the regulating agency as would be required for centralized decision-making. The market-mechanism-plus-regulation, then, is no certain high road to efficiency."*

In addition, Baumol** contends that in those situations in which there are a large number of recipients of an externality, the introduction of a charge mechanism under which the recipients are paid compensation for the externality which they receive is unnecessary. In these situations, the external effect constitutes a public externality and the control of the external effect constitutes a public good. Thus, Baumol asserts:

> "As with all public goods, an increase in one user's consumption does not reduce the available supply to others. Hence, the appropriate price (compensation) to a user of a public good (victim of a public externality) is zero except, of course, for lump sum payments. Thus, perhaps, rather than saying there is no price that will yield an optimal quantity of a public good (externality), it may be more illuminating to say that a double price is required: a nonzero price (tax) to the supplier of the good, and a zero price to the consumer. Of course, no ordinary price can do this job, but a Pigouvian tax, without compensation to those affected by an externality, can indeed do the trick."***

Finally, Marchand and Russell**** demonstrate that, if the cost functions of the recipients of an externality are non-separable, neither a bi-lateral bribe mechanism nor a bi-lateral charge mechanism will produce the optimal allocation of resources. Yet, in this same situation, an appropriate unilateral charge mechanism (a traditional

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*Regan (90), pp. 436-437.

**Baumol (4), pp. 309-312.

***Baumol (4), p. 312.

****Marchand and Russell (66), p. 615.

Pigouvian tax) can induce an internalization of the externality which will produce this optimal allocation of resources. Moreover, this unilateral charge mechanism can also be effective when the cost functions of the recipients of the externality are separable.

Consequently, it can be concluded that the imposition of bi-lateral taxes and subsidies does not constitute a universally appropriate technique for the internalization of externalities. Rather, in each externality situation, the appropriate internalization technqiue must be determined on the basis of such considerations as the cost conditions confronting the recipients of the externality, the number of recipients involved, and the administrative requirements associated with the implementation of the technique.

2.1.9 Transaction Costs and Allocative Neutrality

To derive the conclusion that the allocation of resources at equilibrium is unaffected by modifications of the prevailing liability rule, it is necessary to assume that there are no costs associated with performing transactions. However, in any realistic situation, it is extremely unlikely that this assumption will be satisfied. Therefore, since positive transaction costs inhibit exchange, in any realistic situation, the allocation of resources at equilibrium will be influenced by the particular liability rule which has been adopted. More specifically, in a particular externality situation, the production of the externality will be greater if the resource owner who produces the external effect is declared to have no liability for the damages attributable to this external effect than if this individual is declared to be completely liable for these damages. A change in the prevailing liability rule introduces new opportunities for mutually beneficial exchange and, consequently, produces alterations in the allocation of resources at equilibrium.*

Moreover, in any externality situation, the disparity between the allocations of resources which prevail at equilibrium under different liability rules will increase as transaction costs increase. In fact, it is conceivable that in some situations transaction costs may be so high that movements away from the initial allocation of resources which is specified by the liability rule may be impossible.

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*Samuels (97), pp. 19-20.

Finally, as the externality situation becomes more complex and as the number of resource owners who are involved in this situation increases, deviations from allocative neutrality are likely to expand. Thus, for those large-scale externality situations which are generally acknowledged to be social problems, it is virtually certain that different liability rules will generate different allocations of resources at equilibrium.*

2.1.10 Differential Transaction Costs and Alternative Liability Rules

Demsetz** asserts that the absence of an observable market for an externality may constitute an economically efficient outcome since, when this situation exists, the transaction costs which must be incurred to establish a market for this externality must exceed the benefits which will be obtained by society if this market is established. While this assertion will be unambiguously true if the same level of transaction costs must be incurred for all of the alternative liability rules which might be adopted in this externality situation, its validity is uncertain if different levels of transaction costs are associated with different liability rules.

Consequently, as McKean,*** Mishan,**** Randall,***** and Samuels****** have stated and Crocker (23) has demonstrated empirically, it is fallacious to conclude from an observation that no agreement has been negotiated for the internalization of a particular externality, that no agreement can be negotiated for the internalization of this externality. The adoption of a different liability rule which requires the incurring of a lower level of transaction costs than has been required under the initial liability rule may permit the negotiation of an agreement for the internalization of the externality which has been unattainable under the initial liability rule. Although each alternative liability rule will generate an economically efficient allocation of

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*Randall (88), pp. 43-44.
**Demsetz (35), pp. 13-14.
***McKean (70), pp. 625-626.
****Mishan (77), pp. 70-75.
*****Randall (88), pp. 45-46.
******Samuels (97), pp. 21-23.

resources relative to that liability rule, not all of these efficient allocations of resources will constitute a maximization of net social product.

Thus, if the maximization of net social product is desired, society must make a choice among different economically efficient allocations of resources. In addition, since it is possible that some type of non-market mechanism may involve a lower level of transaction costs than is attainable through a negotiated internalization of the externality under any liability rule, it is conceivable that the maximization of net social product may require the acceptance of some form of governmental intervention.*

2.1.11 Criteria for Choosing the Optimal Internalization Mechanism

The discussion in the preceding sections strongly indicates that, the Coase Theorem notwithstanding, it will be necessary for society to choose among alternative structures of property rights, alternative liability rules, and alternative forms of governmental intervention if the net social product is to be maximized. Moreover, if society desires a reasonable level of assurance that the particular internalization mechanism which it chooses to adopt has a satisfactorily high probability of achieving the maximization of net social product, the choice of this internalization mechanism must be based upon rational selection criteria. Consequently, numerous economic researchers** have proposed that, in any particular externality situation, a society should adopt that internalization mechanism which maximizes the difference between the benefits which will be obtained by the society if the mechanism is adopted and the costs which will be incurred by society if this alternative is chosen.*** Specifically, Demsetz asserts:

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*Demsetz (34), p. 34, Randall (88), pp. 45-46.

**See, for example, Calabresi (16), p. 69; Coase (19), p. 44; Demsetz (34), pp. 33-34; Demsetz (35), p. 19; and Furubotn and Pehovich (43), p. 1145.

*Samuels (97), pp. 23-25, correctly cautions that since the distribution of wealth is influenced by the structure of property rights and, in turn, the equilibrium set of market prices is influenced by the distribution of wealth, the utilization of any particular set of market prices to calculate these benefits and costs presupposes the legitimacy of a particular structure of property rights and potentially biases the results of the selection process in favor of that structure of rights. Obviously, a prudent decision-maker should take this potential bias into consideration before he decides to adopt any specific internalization mechanism.

> "If a net increase in the total value of property follows a change in the mix of rights, the change should be allowed if we seek to maximize wealth. Not to allow the change would be to refuse to generate a surplus of value sufficient to compensate those harmed by the change.*

However, in calculating the benefits and costs which will accrue to society if a particular internalization mechanism is adopted, these benefits and costs must be defined broadly if a reasonable probability of the selection of a socially desirable alternative is to be assured. Thus, it is important to incorporate into the selection process all of the following benefit and cost considerations.

2.1.11.1 The Costs of Defining, Policing, Exchanging, and Enforcing Property Rights**

If the internalization of a particular externality is to be performed through the assignment of property rights to that externality (i.e., the specification of a liability rule with respect to that externality) and the subsequent exchange of these property rights, several costs must be incurred. First, before any exchange can occur, costs must be incurred in defining the property rights which belong to each individual who is involved in the externality situation and in policing the exclusivity of these property rights. Second, if any mutual agreement concerning the internalization of the externality is to be attained, costs must be incurred in negotiating contracts for the exchange or transfer of property rights and, subsequently, in enforcing the contracts which have been negotiated. Obviously, all of these cost elements must be incorporated into the decision-making process which will select the appropriate internalization mechanism for this externality situation.

2.1.11.2 Information Requirements

The derivation of the economic efficiency of negotiated market solutions to externality problems depends critically upon the assumption that, in his decision-making processes, each resource owner who is involved in an externality situation will consider as an opportunity cost the payments of bribes or indemnities which he will forego when he makes any specific resource utilization decision. However, Samuels contends that this assumption is unrealistic. Instead, he asserts, "Actual market costs depend in part on whose interests are made a cost to others, through rights."* Thus, a resource owner who produces an externality will be more likely to consider as a cost the damages which are attributable to this externality if the prevailing structure of property rights requires him to obtain from the resource owners who receive this externality consent to his production of the externality prior to this production than if the prevailing structure of property rights does not require this obtaining of prior consent. This conclusion is especially likely to be relevant if the resource owners who receive the externality never actually offer a bribe to the externality-producing resource owner when the latter structure of property rights prevails. Moreover, it is unlikely that a bribe actually will be offered by the resource owners who receive the externality if their number is sufficiently large that abatement of the externality assumes the nature of a public good. Consequently, inadequate information can be expected to cause economic inefficiency in the internalization of externalities through the negotiated exchange of property rights in numerous externality situations.

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*Demsetz (35), p. 19.

**The material presented in this subsection has been abstracted from Cheung (17), pp. 67-68; Crocker (22), pp. 564-570; Crocker (23), pp. 461-464; and Demsetz (35), pp. 14-15.

Conversely, Davis and Whinston** demonstrate that the implementation of a taxation or subsidy mechanism for the internalization of an externality may impose upon the administrator of this mechanism information requirements which are so demanding as to preclude the adoption of this internalization mechanism. Specifically, the volume of information which must be collected and analyzed to implement a taxation or subsidy mechanism is likely to be sufficient to permit its administrator to determine directly the optimal resource utilization decision for each of the resource owners who is involved in the externality situation. When this outcome occurs, the direct specification of the optimal allocation of resources will be at least as tractable as the calculation of the appropriate tax and subsidy schedules. Moreover, this conclusion can be asserted with greater conviction if the cost functions of the resource owners who are involved in the externality situation are non-separable than if these cost functions are separable.

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*Samuels (97), p. 18.

**Davis and Whinston (31) and Davis and Whinston (32).

Although Davis and Whinston do propose an iterative procedure for the determination of appropriate taxes and subsidies which circumvents most of these information collection and analysis requirements,* the implementation and operation of this procedure is not costless. Consequently, they conclude that in many externality situations the optimal public policy might be to permit the merger of the resource owners who are involved in the situation until the "natural unit" for decision-making has been achieved.**

Finally, Dolbear*** establishes that the implementation of a taxation or subsidy mechanism for the internalization of externalities in situations in which some or all of the resource owners who are involved in the situations are merely consumers generally will require the obtaining of detailed information about the nature of the preference function of each of these resource owners. Obviously, the collection of this information will be extremely expensive. In fact, it may be impracticable at any cost.

Consequently, it is impossible to assert that any specific internalization mechanism unambiguously requires the least costly amount of information in all externality situations. Rather, it must be concluded that the selection process which determines the internalization mechanism which will be adopted in any particular externality situation should carefully consider the information requirements associated with each of the alternative mechanisms which is available for adoption.

2.1.11.3 Uncertainty

The derivation of the Coase Theorem assumes that all of the consequences arising from the production of a particular externality are known with certainty by either the resource owners who produce the externality or the resource owners who receive the externality and, hence, that all of the consequences will be incorporated appropriately into the negotiated agreement for the internalization of the externality. Yet, in practice, this assumption seldom will be satisfied in any realistic situation.

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*Davis and Whinston (32), pp. 312-316.

**Davis and Whinston (31), p. 261.

***Dolbear (39), pp. 97-99 and pp. 101-103.

Recognizing that this condition exists, Demsetz arrives at the following conclusion:

> "The greater the uncertainty of effect, the less inclined we should be to require that prior compensation be paid to those harmed or prior fees be charged of those benefited. The cost of sorting out and measuring legitimate claims in cases of great uncertainty would be so high as to undermine efficient resource use.... Innovation and change would be uneconomically hampered by the imposition of such costs in the presence of uncertainty."*

Conversely, Mishan** expresses a strong preference for the adoption of a liability rule which incorporates a strong bias against, or even an effective prohibition of, the production of externalities when substantial uncertainty exists. In fact, Mishan contends, "Insofar as the group concerned underestimates the effects on itself of a number of spillovers, the negotiated solution, even where practicable, is not satisfactory."***

To understand the basis for these diametrically opposed positions, it must be realized that Demsetz considers the uncertain effects to be relatively insignificant and reversible, while Mishan regards these effects as major and irreversible. A reconciliation of these polar attitudes is provided by Calabresi,**** who acknowledges that either of these conditions might prevail in different externality situations and, hence, that in any particular uncertain situation, society should adopt that liability rule for which the market is most likely to correct an error in the initial assignment of property rights. A generalization of this basic principle is provided by Cheung,***** who suggests that, in any uncertain situation, the socially most desirable liability rule can be determined by comparing the risk associated with the adoption of each alternative liability rule with all of the other costs and benefits attributable to the adoption of that rule. Obviously, the application of this general principle is not limited solely to choices among alternative liability rules and, hence, can be extended to choices among all possible forms of internalization mechanisms.

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*Demsetz (37), p. 64. Demsetz later qualifies this conclusion by stating, "The requirement of prior compensation if those affected can be ascertained easily and the denial of prior compensation when those affected can be identified only with great difficulty does not deny the efficiency of requiring compensation in many of the uncertain cases after the fact."

**Mishan (77), pp. 81-82.

***Mishan (77), p. 81.

****Calabresi (16), pp. 69-70 and pp. 72-73.

*****Cheung (18), pp. 24-29.

This principle implies that, since all externality situations do not involve the same degree of uncertainty, different internalization mechanisms will be socially most desirable in different externality situations. Moreover, since different communities may exhibit different degrees of risk aversion, this principle implies that different communities rationally may adopt different internalization mechanisms for essentially identical externality situations.

2.1.11.4 Stability of Equilibrium

The derivation of the economic efficiency of the allocation of resources which arises under each alternative liability rule which is available for adoption requires only the application of comparative static techniques. However, the process through which each of these economically efficient allocations of resources is negotiated in the market is dynamic. Thus, Weld (114) contends that, in selecting among alternative liability rules, society should consider both the pattern of convergence to equilibrium and the speed of convergence to equilibrium which will prevail under each of these liability rules. In particular, he asserts that a minimal condition which must be satisfied by any acceptable liability rule is that, in response to any disturbance of an equilibrium which has been established under that liability rule, a new economically efficient allocation of resources will be negotiated. Moreover, he declares that the consideration of stability in the evaluation of alternative liability rules should not be restricted to a consideration of narrowly defined economic concepts of stability but, in addition, should include a consideration of the stability of legal, neighborhood, and societal interests. Obviously, these stability requirements are applicable not only to the evaluation of alternative liability rules, but can be applied with equal validity to the evaluation of other internalization mechanisms.

2.1.12 Implications for the Selection of Specific Internalization Mechanisms

If the selection criteria which have been described in the preceding section are acknowledged to be reasonable, it becomes justifiable to derive from these criteria general recommendations for the selection of socially desirable internalization mechanisms. Thus, Demsetz proposes that, in choosing the particular liability rule which is most likely to constitute the most effective mechanism for the internalization of externalities through the negotiation of mutual agreements in a specific externality situation, "... it will be efficient to assign new property rights in a way that is expected to minimize the cost of transacting that will be required subsequently."* For example, in an externality situation in which the number of resource owners who receive the externality is sufficiently large that the abatement of the externality assumes for them the nature of a public good, while the number of resource owners who produce the externality is sufficiently small that no significant public goods problem arises for them, liability for the damages attributable to the externality should be assigned to the resource owners who produce this external effect since this assignment of property rights will simultaneously minimize transaction costs and maximize the probability that the externality will be internalized through negotiated agreements.

The empirical validity of this proposal has been demonstrated by Crocker (23), who has isolated a specific situation in which the reassignment of liability for the damages attributable to air pollution from the recipients of this pollution to its emitters has substantially increased the extent to which agreements for the internalization of this externality have been negotiated. At a more conceptual level, Liebhafsky (61) has utilized this proposition to justify his assertion that, in any situation in which the assignment of liability for damages to the resource owners who receive an externality motivates these resource owners to bribe the resource owners who produce this externality to refrain completely from this production, the granting of an injunction which prohibits the production of the externality will be more economically efficient than the adoption of any liability rule. Finally, on the basis of this proposal, McKean (70) has developed a framework for the evaluation of the relative merits of a wide range of alternative assignments of liability for the damages attributable to product failure.

While all of these studies have applied the proposal that the socially most desirable alternative in an externality situation is that alternative which minimizes transactions costs only to choices among alternative liability rules, Cheung* contends that this proposal is equally applicable to choices between internalization mechanisms which rely solely upon negotiated agreements and internalization mechanisms which require governmental intervention. Moreover, he asserts that the application of this proposition to choices of this type generally will result in the adoption of an internalization mechanism which relies solely upon the negotiation of mutually acceptable agreements. Cheung expects this outcome to prevail for two reasons. First, the voluntary exchange in organized markets of rights to produce, or to prevent the production of, externalities automatically generates information about the benefits and costs arising from the use of these rights. This information can be obtained only at considerable cost when the government regulates the use of these rights and, hence, completely voluntary exchange is precluded. Second, since the internalization of many externalities requires the simultaneous satisfaction of several equilibrium conditions, a single regulation, such as a specific excise tax or a specific excise subsidy, may be incapable of promoting internalization in many instances. Yet, in these same situations, a voluntarily negotiated agreement which contains multiple stipulations can produce an economically efficient allocation of resources. In general, an agreement of this type can be replaced only be a set of governmental regulations.

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*Demsetz (37), p. 66. A similar proposal is advanced by Crocker (23), p. 464.

Although Cheung's reasoning undoubtedly is applicable in many externality situations in which only a small number of resource owners either produce or receive the externality, it clearly is inappropriate in those situations in which either the number of resource owners who produce the externality or the number of resource owners who receive the externality is sufficently large that the internalization of the externality assumes the nature of a public good. In this situation, the negotiation and enforcement of an internally consistent set of voluntarily negotiated agreements between each resource owner who produces an externality and each resource owner who receives this externality will be extremely expensive, if not impossible.

Recognizing this problem, Randall** asserts that, in any situation of this type, internalization of the externality requires either the

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*Cheung (17), pp. 68-70.
**Randall (88), pp. 46-52.

establishment of a collective organization which includes as members all resource owners for which control of the externality constitutes a public good or the creation of a public administrative agency to represent the interests of these resource owners. Moreover, if a collective organization is established, this organization should not require that all of its members must consent to any action which it undertakes, since the transaction costs which are associated with the implementation of a unanimity requirement of this type will be essentially identical to the transaction costs which arise when each resource owner independently negotiates his own agreements for the internalization of the externality. Consequently, a collective organization should be permitted to undertake actions with less than the unanimous agreement of its members, despite the realization that any deviation from unanimity admits the possibility that economically inefficent actions might be undertaken.*

Similarly, although Buchanan** contends that, when transaction costs are nonexistent, the attainment of an economically efficient allocation of resources by a public administrative agency requires that the decision-maker who has the right to make the final resource allocation decision for the entire community must be able to collect and maintain the potential rent of this right in the form of personal side payments, he concedes that the prohibition of the collection of personal side payments by the decision-makers of public administrative agencies may be consistent with the attainment of economic efficiency when the internalization of the externality assumes some characteristics of a public good. When public goods problems arise, the resource owners who produce the externality and the resource owners who receive the externality will not be equally motivated to offer side payments to the relevant decision-maker and, hence, the permission of side payments may promote economic inefficiency.

Acknowledging the relative strengths and weaknesses of collective organizations and public administrative agencies, Randall concludes that, in general, as the number of resource owners who are involved in an externality situation increases, collective organizations become relatively less effective and public adminstrative agencies become relatively more effective in performing the internalization of the externality. Moreover, he asserts that, if either a collective organization has been established or a public administrative agency has been created, it may be desirable to allow dissatisfied members of the group which is represented by the collective organization or public administrative agency "...to have individual access to the courts...to complain that the collective or agency has not acted appropriately."*

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*Buchanan (13), pp. 446-448 strongly supports Randall on this issue.

**Buchanan (12), pp. 589-594.

Finally, Baumol** demonstrates that if a particular externality is sufficiently strong, any specific internalization mechanism may generate any one of several different economically efficient allocations of resources. However, only one of these allocations of resources will constitute the socially most desirable allocation relative to that internalization mechanism. Consequently, it is impossible to guarantee that the internalization mechanism will produce its socially most desirable allocation of resources. In this situation, Baumol recommends that society should specify a set of minimum standards of acceptability and, subsequently, seek to develop a taxation and subsidy mechanism which is capable of attaining these specified standards. A similar proposal is advanced by Dales (25), who asserts that the stringent information requirements of those mechanisms which provide for the complete internalization of externalities renders these mechanisms impossible to implement. Consequently, he concludes that the best available strategy for the control of an externality consists of the specification of a set of minimum standards of acceptability in the production of this externality, the creation of that quantity of rights to produce this externality which is consistent with these standards, and the establishment of a market in which these rights can be exchanged. Obviously, the prices which are established for these rights in this market are functionally equivalent to Baumol's taxes and subsidies as incentives for the attainment of the specified standards.

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*Randall (88), p. 52. Once again, Randall's position is consistent with that of Buchanan, who states, "In this setting, the only role of the judiciary should have been one of determining whether or not the decision taken by the legislature was made constitutionally." Buchanan (13), p. 449.

**Baumol (4), pp. 315-320.

When a person's activity causes damage to a landowner, the landowner may have a property right which can be invoked to force the person causing the damage to cease the activity and to compensate the landowner for any damage incurred. The law of nuisance is applied to determine whether the landowner does have a property right which has been violated. A private nuisance has been defined as "an interference with the use and enjoyment of land.* Courts have recognized their role in the area of nuisance as primarily resolving the conflict between two opposing principles of property law:

> "The land of nuisance plys between two antithetical extremes: The principle that every person is entitled to use his property for any purpose that he sees fit, and the opposing principle that everyone is bound to use his property in such a manner as not to injure the property or rights of his neighbor. For generations, courts, in their tasks of judging, have ruled on these extremes according to the wisdom of the day, and many have recognized that the contemporary view of public policy shifts from generation to generation."**

The purpose of Section 2.2.1 will be to examine the law of nuisance and attempt to observe the "judicial wisdom of the day."

Property rights may also be violated when the government attempts to regulate a landowner's use of his property. As in the area of nuisance law, two conflicting legal principles must be reconciled by the courts to determine whether a property right has been violated. The first principle is that the government does not violate any property rights when, through its inherent police power, it regulates the use of land to promote the health, safety, morals, and general welfare of the people. The second principle is that a property right exists which protects a landowner from the government's power of eminent domain unless his land is taken for a public purpose and only after just compensation is paid.*** The requirement of a public purpose has been expanded to include most governmental activities.* Thus, the conflict narrows to a discussion of whether the government action is regulatory, in which case no property right is involved, or whether it amounts to a taking, in which case a landowner has a property right to receive compensation. The conflict between taking and regulation will be examined in Section 2.2.2.

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*Prosser (87), Chapter 15, p. 591.

**Antonik v Chamberlain, 81 Ohio App. 465, 475, 78 N.E. 2d 752, 759 (Ct. App. Summit County 1947).

***For a discussion of just compensation, see Almota Farmers Elevator & Warehouse Co. v. United States, 409 U.S. 470, 473-474 (1973).

2.2.1 Externalities, Environmental Quality and Nuisance Law

Before examining nuisance law, a brief discussion of the court system in the United States is necessary. Actually, there are two court systems in the United States: federal and state. The federal courts have not decided many nuisance law cases. The very nature of the controversy -- a local, land related matter -- tends to eliminate the diversity of citizenship usually required for federal jurisidction in this area.

The state courts have decided most of the cases in the area of nuisance law. It should be emphasized that decisions in one state are not binding upon another state and, hence, have only persuasive value in any other state. This results in a lack of consistency in decisions throughout the United States. On the other hand, while differences exist among the states, certain nuisance law concepts seem applicable to nearly all jurisdictions.

Furthermore, even in a given state, a court may choose not to follow its earlier decisions under certain circumstances. Changes in economic or social conditions may compel a court to shift, if not totally reverse, its previously announced position. However, the doctrine of stare decisis -- an adherence to previous precedents -- tends to preserve consistency and stability in court decisions.

Therefore, when one considers the cases discussed in this report, both the independence of the state courts and the possible shift in a court's position over time must be kept in mind.

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*A "public purpose" in environmental cases has included a taking for: flood control (Ocean County v. Stockhold, 129 N.J. Super. 323 A. 2d 515 (1974)), scenic beauty (Wes Outdoor Advertising Co. v. Goldberg, 55 N.J. 347, 262 A. 2d 199 (1970)), and urban park (King County v. Farri, 7 Wash. App. 600, 501 P. 2d 612 (1972)).

The use of nuisance law as a deterrent to pollution and as a means to internalize the costs of land use has a long history beginning in English case law.* A private nuisance action has been used to abate nearly every common form of pollution: air,** water,*** solid waste,**** noise,***** and sight pollution.****** Private actions under nuisance law presently do not internalize all the costs of land use, nor can nuisance law as presently interpreted solve the major problems of our environment. However, private actions can complement government efforts.

An understanding of the private action in nuisance is essential to understanding the legal framework which permits some externalities. Furthermore, legislative acts can help tó reduce some of the barriers erected by the common law, which may no longer be applicable in a society where greater exploitation of our natural resources may not promote social welfare.******* For these reasons, the elements of a private nuisance, the remedies available if a nuisance is found, and the defenses that the common law recognizes, all will be examined.

2.2.1.1 The Elements of a Private Nuisance

The Supreme Court in Euclid v. Ambler ******** has found that "a nuisance may be merely the right thing in the wrong place, like a pig in the parlor instead of the barnyard."********* Even a pig in the barnyard has been found to be a nuisance,********** but it cannot be denied that "a nuisance may undoubtedly arise from a land use incompatible with the surrounding neighborhood."*********** Thus, the first element of a nuisance is the unreasonable use of one's land as determined by the character of the neighborhood.

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*William Aldred's Case, 77 Eng. Rep. 816 (K.B. 1611). See Winfield (116) for a general history.

**Campbell v. Seaman, 63 N.Y. 568 (1876).

***Johnson v. City of Fairmont, 188 Minn. 451, 247 N.W. 577 (1933).

****Lind v. City of San Luis Obispo, 109 Cal. 340, 42 P. 437 (1895).

*****Hennessey v. Carmony, 50 N.J. Eq. 616, 25 A. 374 (1892).

******Note (80).

*******See note *** on p. 2.41 and accompanying text.

********Euclid v. Ambler Realty Co., 272 U.S. 365 (1926).

*********Id. at 388.

**********Baldwin v. McClendon, 292 Al. 43, 288 So. 2d 761 (1974).

***********Township of Bedminster v. Vargo Dragway, Inc., 434 Pa. 100, 253 A. 2d 659 (1969).

Certain activities which may be perfectly reasonable in industrial areas or in the country are not suitable in residential communities. Courts have found that a powder mill,* a factory,** or a stable*** if located in residential areas are nuisances, but these same activities are surely permissible in the proper setting.

Conversely,

> "It appears to be well settled that if one voluntarily elects to live in an industrial area, he cannot complain of noise, noxious odors or any other unpleasant factors that may arise from the normal operation of businesses in the area merely because they may interfere with his personal satisfaction or aesthetic enjoyment. It is said that no one can move into an area given over to foundaries and boiler shops and demand the quiet of a farm."****

Once it has been determined that the activity is unreasonable for the area, it must also be proven that the interference is substantial. For instance, a slight amount of noise or smoke is permissible,***** but the activity will be considered a nuisance if it is sufficient to "interfere with the ordinary comfort of human existence."****** The Supreme Court of New Hampshire considered substantial harm to be that "in excess of the customary interferences a land user suffers in an organized society. It denotes an appreciable and tangible interference with a property interest."*******

Both of these required elements introduce the possibility that a landowner will be able to externalize the costs of his land use. The fact that the common law condones the reasonable use of one's land as determined by the character of the neighborhood, deprives the person who voluntarily or through economic necessity lives in a commercial area of a nuisance remedy. Therefore, potential polluters need only locate in the proper area to be free from compensating their neighbors for the pollution they cause. The only apparent remedy appears to lie in governmental action.

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*Cumberland Torpedo Co. v. Gaines, 201 Ky. 88, 255 S.W. 1046 (1923).

**Riblet v. Spokane Portland Cement Co., 41 Wash. 2d 249, 248 P. 2d 380 (1952).

***Johnson v. Drysdale, 66 S.D. 436, 285 M.W. 301 (1939).

****Lee v. Florida Public Utilities Co., 145 So. 2d 299, 301 (Fla. App. 1962).

*****Prosser (87), p. 79.

******Holman v. Athens Empire Laundry Co., 149 Ga. 345, 351, 100 S.E. 207, 210 (1919).

*******Roble v. Lillis, 112 N.H. 492, 299 A. 2d 155, 158 (1972).

The second requirement for a substantial interference also permits placing burdens upon neighboring landowners as long as one does not cause a substantial interference. However, advances in science which make detection of interference easier and prediction of the long-term harm more certain, possibly will reduce the landowner's ability to shift this burden upon his neighbors.

2.2.1.2 Remedies

Nuisance law permits two general forms of remedy, damages or injunctive relief. Normally, if damages can be ascertained, injunctive relief will not be available. Only if the damages cannot be determined or if the nuisance would require continued litigation will the court permit injunctive relief. These general principles, however, are not always applied. In two recent cases, Boomer v. Atlantic Cement Co.* and Baldwin v. McClendon,** the courts permitted the payment of damages which would compensate the injured party, not only for the past and present, but for future injury as well. As the Court in Baldwin stated:

> "The damages awarded are measurable for all time.... In that case, the measure of damages for the nuisance, is the difference in the value of the property for a home with and without such odor."***

This result forces the landowner to shoulder the burden of his land use, at least to the extent that it diminishes the value of the adjoining property.

However, if damages are not ascertainable or the damage is likely to be a continuing one, forcing constant litigation, the court may enjoin the landowner from engaging in the activity. The Supreme Court of Pennsylvania, when confronted with a drag strip located in a residential community, found:

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*Boomer v. Atlantic Cement Co., 26 N.Y. 2d 219, 257 N.E. 2d 870, 309 N.Y.S. 2d 312 (1970).

**Baldwin v. McClendon, 292 Al. 43, 288 So. 2d 761 (1974).

***Id. at 767.

> "No man has a right to take from another the enjoyment of the reasonable and essential comforts of life and, consequently, cannot commit acts on his own premises calculated to interfere with the reasonable enjoyment by others of their homes."*

The court granted the plaintiffs' request for an injunction against defendant's drag strip. There appears to be no discussion as to whether the plaintiffs' damages could be ascertained, but the damage appeared to be a continuing one.

One's remedy in nuisance law does tend to force a landowner to pay the costs of the use of his land. Assuming damages are properly measured, it would appear that the law, when it does find a nuisance, places the burden of external costs upon the land user. However, although all costs are internalized when injunctive relief is obtained, this remedy also embodies the possibility that the enjoined land user may be forced to discontinue an operation which could profitably be continued even if he were required to pay the external costs.

2.2.1.3 Defenses in the Nuisance Law

There are numerous occasions when a nuisance is found to exist, thus externalities are present, and the law does not provide the plantiff with an injunctive remedy, and often not even with damages. There are three doctrines that a court may apply which prohibit recovery even after a nuisance is found: balancing the equities doctrine; coming to the nuisance doctrine; and the prescriptive easement.**

2.2.1.3.1 Balancing the Equities

The doctrine of balancing the equities sometimes requires a court to deny a remedy to the plaintiff even if a nuisance is proven. The courts have often examined the harm alleged by the plaintiff and compared it to the harm that the defendant and society would suffer if the defendant had to cease operations. Thus, in Clifton Iron Co. v.

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*Township of Bedminster v. Vargo Dragway, Inc., 434 Pa. 100, 253 A. 2d 659, 662 (1969).

**The general principles of laches may also bar recovery. See discussion of laches, Arnovitch v. Levy, 238 Minn. 237, 56 N.W. 2d 570, 574 (1953).

Dye,* the development of mining interests was judged to be more important than the pollution the defendant caused by his operations. Other earlier cases have similar holdings, but the most articulate may be found in Pennsylvania Coal Co. v. Sanderson:**

> "The plaintiff's grievance is for a mere personal inconvenience; and we are of the opinion that mere private personal inconveniences...must yield to the necessities of a great public industry, which, although in the hands of a private corporation, subserves a great public interest. To encourage the development of the great natural resources of a country trifling inconveniences to particular persons must sometimes give way to the necessity of a great community."***

The defendant not only was encouraged to continue his activity, but the plaintiff was not even given money damages. When society's interests are aligned with the defendant, the balance of equities invariably will favor the polluter and not the plaintiff seeking relief.

Similarly, the defendant's own financial interests must be examined to determine:

> "If the resulting damage...because of the nuisance cannot be avoided, or only at such expense as would be practically prohibitive to a person in the enjoyment of his own land, he (the defendant) may not be required to abate the nuisance."****

In this recent Pennsylvania case, the Commonwealth was attempting to stop the pollution of a stream, but lost because of its inability to formulate a practical plan of abatement.

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*Clifton Iron Co. v. Dye, 87 Ala. 468, 6 So. 192 (1888) and see 40 ALR 3d 601.

**Pennsylvania Coal Co. v. Sanderson, 113 Pa. 126, 6A. 453 (1886).

***Id. at 149, 6A. 459.

****Commonwealth v. Wyeth Laboratories, 12 Pa. Cmwlth Ct. 327, 315 A. 2d 648, 653 (1974).

There have been a few early cases which supported the plaintiff's right to have the nuisance abated without balancing the equities.* However, in many jurisdictions these cases have been ignored** and in the majority of jurisdictions the balancing doctrine is applied.***

Balancing the equities permits externalities to continue, as long as courts view society's interest in terms of exploitation of natural resources and increased production. Society's real interest (e.g., protecting the environment) may lie in granting the injunction and stopping the pollution. Courts have so far been unwilling to weigh society's intangible interests against the tangible economic detriment to the defendant and community.

2.2.1.3.2 Coming to the Nuisance

The coming to the nuisance doctrine prevents the plaintiff from recovering because:

> "One who voluntarily places himself in a situation whereby he suffers an injury will not be heard to say that his damage is due to the nuisance maintained by another."****

The parallels between this doctrine and the reasonable use requirement for finding the existence of a nuisance are readily apparent. Both permit a nuisance to continue if it has been established in the locality.

Apparently, the only element that the defendant must prove is that the plaintiff knew of the nuisance when he came to the locality. Thus, a person who moves next to a golf course cannot complain that golf balls are falling on his property.*****

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*Wente v. Commonwealth Fuel Co., 232 Ill. 526, 83 N.E. 1049 (1908); Hennessey v. Carmony, 50 N.J. Eq. 616, 25 A. 374 (1892); Sullivan v. Jones & Laughlin Steel Co., 208 Pa. 540, 57 A. 1065 (1904); Whaland v. Union Bag & Paper Co., 208 N.Y. 1, 101 N.E. 805 (1913).

**Haack v. Lindsay Light & Chemical Co., 393 Ill. 367, 66 N.E. 2d 391 (1946); Boomer, supra note * on p. 2.39.

***See 40 ALR 3d 601.

****Oetjen v. Goff Kirby Co., 38 Ohio L. Abs. 117, 124, 49 N.E. 2d 95, 99 (Ct. App. Cuyahoga County, 1942).

*****Patton v. Westwood Country Club, 18 Ohio App. 2d 137, 247 N.E. 2d 761 (1969).

The coming to the nuisance doctrine gives a polluter of long standing almost blanket protection against successful attack under the nuisance law, thus permitting the externality to continue ad infinitum.

2.2.1.3.3 Prescriptive Easement

If the polluter has been engaged in his activity long enough, he may be able to continue the activity because he has a prescriptive right. One commentator has described the situation as follows:

> "If the pollution has been continuing for some time, the polluter's wrongdoing may have ripened into a judicially protected right...which...rewards wrongdoers who are patient, persistent, and non-reforming."*

There are at least two elements which a polluter must prove in order to establish a prescriptive easement. First, there must be a continuous polluting activity through time and, second, there must exist a definite level of pollutants over time.** A recent Oregon case demonstrates how a court may liberally interpret these requirements and thus permit the polluting activity to continue.*** The plaintiff's land was periodically flooded because of a dam built upon the defendant's property. The court found that there was continuous polluting activity, even though there were intervals between the flooding of as long as a year or two. The court also discussed the need for a definite level of pollutants and concluded:

> "All that is necessary to meet the requirement of definiteness where there is a variation in the area invaded is that the maximum or outer limits of the interference be established."****

The prescriptive easement may have the same effect as the coming to the nuisance doctrine, namely, once the pollution has occurred for a long enough period, the nuisance laws may not provide a remedy, thus permitting the externality to continue. Legislative changes of these common law defenses would increase the ability of private individuals to correct environmental problems.

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*Juergensmeyer (52), p. 1136.

**See West Kentucky Coal Co. v. Rudd, 328 S.W. 2d 156, 160 (Ky. 1959).

***Arrien v. Levanger, 263 Or. 363, 502 P.2d 573 (1972).

****Id. at 575.

2.2.1.4 Nuisance Actions Against the Government

Up until this point it has been assumed that the tort feasor in the nuisance action was a private party. A nuisance action may also be instituted against most government entities. The private nuisance law that the court will apply should not differ depending upon the nature of the defendant. However, some government entities have retained all or part of their sovereign immunity from tort liability which may bar recovery.

The Federal government has permitted tort suits against it in the Federal Tort Claims Act, with certain important limitations.* First, claims cannot be based upon the exercise or failure to exercise a discretionary function.** Second, the courts have required that negligence or wrongdoing must be alleged.*** However, beyond these exceptions,

> "The United States shall be liable respecting the provisions of this title relating to tort claims, in the same manner and to the same extent as a private individual under like circumstances..."****

The situation regarding state immunity varies from jurisdiction to jurisdiction. Some jurisdictions, like Washington, have no sovereign immunity,***** while other states have no immunity but have Tort Acts similar to the Federal legislation.* Even where tort liability is permitted, the state may have retained immunity if a discretionary function is involved or if a statute authorizes the nuisance.

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*28 U.S.C. §1346 (1970).

**28 U.S.C. §2680 (1970).

***See Dalehite v. United States, 346 U.S. 15, 44 (1953).

****28 U.S.C. §2674 (1970).

*****Wash. Rev. Code S4.92.090 (Supp. 1971).

Clearly attempting to internalize the costs of the government's use of land is more difficult than in private cases. However, success against government entities under a nuisance is possible and has been obtained.**

2.2.2 The Inherent Conflict: Taking Versus the Police Power

It was seen in the area of nuisance law that the courts recognized two conflicting principles: the right of a landowner to use his land and the duty of a landowner not to interfere with the rights of others. The resolution of this conflict by the courts permitted numerous instances of externalities, either because a nuisance was not present or because a defense was available to the polluter.

The property rights of a private landowner in relationship to the government also contain conflicting legal principles. Government has the inherent right to protect the health, safety, morals, and general welfare of the people. The police power was described by the Supreme Court as:

> "One of the most essential powers of government, one that is least limitable. It may, indeed, seem harsh in its exercise, usually is on some individual, but the imperative necessity for its existence precludes any limitation upon it when not exerted arbitrarily."***

Thus, the police power should be a formidable tool for government to regulate the use of land, and is a basic part of the property relationship between the government and a private landowner.

The Fifth Amendment of the Constitution of the United States prohibits the taking of property without just compensation. This provision is a "seemingly absolute protection" against the possibility of the government appropriating a private party's property without compensating the owner.* It too is a basic part of the property relationship between the government and a private landowner.

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*Cal. Gov't. Code §810-895.8 (West 1966).

**See Nestle v. City of Santa Monica, 6 Cal. 3d 920, 496 P. 2d 480, 101 Cal. Rptr. 568 (1972).

***Hadacheck v. Sebastian, 239 U.S. 394, 410 (1915).

In Pennsylvania Coal Co. v. Mahon,** the Supreme Court found that the police power qualifies the protection granted under the Fifth Amendment. Justice Holmes, speaking for the Court, concluded:

> "The natural tendency of human nature is to extend the qualification more and more until at last private property disappears...We are in danger of forgetting that a strong public desire to improve the public condition is not enough to warrant achieving the desire by a shorter cut than the constitutional way of paying for the change."***

Since the decision in Pennsylvania Coal Company the state courts have struggled to strike the proper balance between the police power qualification and the seemingly absolute prohibition against taking property without paying just compensation. As in the area of nuisance law, since the state courts are independent, there is a lack of uniformity among the state decisions.

A further complication in this area exists because many states have constitutional provisions similar to the Fifth Amendment prohibition against taking, while other states have prohibitions not only against taking, but also against damaging one's property without compensating the owner.**** Normally in the context of environmental quality this distinction is unimportant, but the reader should be aware that state constitutional provisions do exist that are somewhat different from those of the Fifth Amendment.

Numerous commentators have attempted to rationalize the cases which involve the conflict between a government's ability to regulate and its inability to take private property without just compensation.* Numerous tests have been devised, all seemingly unable to reconcile the court decisions.** For organizational purposes, the cases will be divided between those where diminution of property values was considered a taking requiring compensation and those where the diminution was permissible under the police power.

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*Pennsylvania Coal Co. v. Mahon, 260 U.S. 393, 413 (1922).

**Id.

***Id. at 413.

****See P. Nichols, Eminent Domain, §6.1 (3rd Rev.) 1974.

2.2.2.1 Diminution of Property Value Sufficient for Taking

The Supreme Court, in Pennsylvania Coal Co. v. Mahon, stated the diminution of value test:

> "Government hardly could go on if, to some extent, values incident to property could not be diminished without paying for every such change in the general law...One fact for consideration...is the extent of the diminution. When it reaches a certain magnitude, in most cases if not all cases there must be an exercise of eminent domain and compensation to sustain the act."***

Since the Pennsylvania Coal decision, courts have strived to determine what magnitude of diminution is the "certain magnitude" mentioned by Justice Holmes. Courts have concluded that neither financial hardship nor substantial diminution is sufficient for a taking, but have instead required "a property owner be unable, permanently, to use his property...and is therefore deprived of all beneficial use thereof..."**** Despite what appears to be an insurmountable burden for a plaintiff, many property owners in environmental cases have succeeded in satisfying the test.

In Morris County Land Improvement Co. v. Township of Parsippany-Troy Hills,***** zoning regulations had created a meadowlands to promote flood control. The uses permitted the plaintiff were very limited and severely reduced the property's value. The New Jersey Supreme Court concluded that the regulations "are clearly far too restrictive and as such are constitutionally unreasonable and confiscatory."* The court, in determining the property's value, examined not only its present value as a swamp, but its potential value if filled. For that reason there was a great diminution of value, which resulted in a taking without compensation as opposed to a permissible regulation.

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*See Michelman (73).

**Id. at 1202.

***260 U.S. at 413.

****Bureau of Mines of Maryland v. George's Creek Coal and Land Co., Md., 321 A. 2d 748, 762 (1974) and cases cited therein.

*****40 N.J. 539, 193 A.2d 232 (1963).

In State v. Johnson,** the State Wetlands Control Board attempted to prohibit the filling of coastal wetlands. The landowner argued that such a regulation made his property "commercially valueless land."*** The Supreme Court of Maine agreed, holding that the prohibition amounted to a taking of property without just compensation, and an unreasonable exercise of the police power. As in the Morris case, the value of the property included its potential after land fill.

In Dooley v. Town Plan and Zoning Commission of Town of Fairfield,**** the plaintiff's property was zoned as a flood plain with a limited number of uses, and in fact, the court found that "use of the plaintiff's land has been, for all practical purposes, rendered impossible."***** The diminution in value was estimated to be approximately 75 percent, which the Supreme Court of Connecticut found to be a taking without just compensation.

A case which also found that the zoning board had exceeded its police power was Vernon Parking Realty Co. v. City of Mount Vernon.****** This case differed from those previously discussed in that it attempted to maintain a commercial use which was considered beneficial. The plaintiff's property was used as a parking garage and the zoning board wanted to assure future parking availability so it designated a downtown area which included palintiff's property as a "Designated Parking District." The court found that the restriction "destroyed the greater part of the value of the property,"******* forcing him to carry the burden of providing parking.

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*193 A.2d at 242.

**265 A.2d 711 (Me. 1970).

***Id. at 716.

****151 Conn. 304, 197 A.2d 770 (1964).

*****197 A.2d at 772.

******307 N.Y. 493, 121 N.E. 2d 517 (1954).

*******121 N.E. 2d at 520.

Even when a zoning board attempts to plan growth in a community, a substantial diminution of plaintiff's property for an unreasonable period of time is considered a taking without just compensation. In Averne Bay Construction Co. v. Thatcher,* the plaintiff owned land in Brooklyn which was zoned residential. There was no current demand for housing and no demand was expected for some time. The New York Court of Appeals permitted the plaintiff to build a gas station, arguing that only temporary diminution of value was permissible under the police power.

Zoning plans have also been held to go beyond the police power when they indirectly depress the price of the plaintiff's property. In Miller v. Beaver Falls,** the plaintiff's land was planned as a park, thus greatly reducing its present value. The court found this diminution was a taking requiring compensation and not a valid exercise of the police power.

The effect of these decisions on the governmental cost of providing environmental quality is clearly adverse. Cases like Morris County, Dooley, and Johnson hinder government's efforts to protect the population and the environment from the hazards of flooding. On the other hand, permitting the regulation would place an unreasonable burden on an individual for a benefit that the entire society will receive.

Cases like Miller and Averne Bay reduce a government's ability to rationally plan for future growth. The result of these types of cases is to permit urban sprawl. But, again, permitting the regulation appears to place a great burden upon the individual for the benefit of society in general.

2.2.2.2 Diminution in Value Without a Taking

An early case permitting extreme diminution of value within the police power was Hadachek v. Sebastian.*** Despite the plaintiff's loss of nearly 90 percent of the value of his property, the court found no taking, commenting that the exercise of the police power is sometimes "harsh."

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*278 N.Y. 222, 15 N.E. 2d 587 (1938).

**368 Pa. 189, 82 A.2d 34 (1951).

***Hadachek v. Sebastian, 239 U.S. 394, 410 (1915).

Recently, courts have again begun to permit substantial diminution, verging on total deprivation, without compensation. The zoning board, in Turnpike Realty Co. v. Town of Dedham,* established a flood plain district very similar to the cases just mentioned. However, the result was vastly different. The diminution of the plaintiff's land was approximately 90 percent, but the Massachusetts Supreme Court concluded:

> "We realize that it is often extremely difficult to determine the precise line where regulation ends and confiscation begins. The result depends on the 'peculiar circumstances of the particular instance'...In the case at bar we are unable to conclude, even though the judge found a substantial diminution in the value of petitioner's land, that the decrease was such to render it an unconstitutional deprivation of property."**

The Massachusetts Supreme Court's analysis is not vastly different from those earlier cases discussing diminution. The only difference is that it expands police power qualification of the Fifth Amendment prohibition against taking without just compensation. Clearly, environmental quality can be improved under the existing legal system if a court follows the Massachusetts example of expanding the police power.

A Wisconsin case, Just v. Marinette County,*** approaches the diminution problem from a different perspective. In Just, the plaintiff attempted to fill some property along a shoreline. However, this filling was prohibited by the zoning ordinance. The zoning board fined the Justs and the conviction was appealed. The court basically redefined the proper value that should be considered in determining whether there has been a substantial diminution of value.

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*284 N.E. 2d 891 (Mass. 1972).

**Id. at 894.

***56 Wis. 2d 7, 201 N.W. 2d 761 (1972).

> "The Justs argue their property has been severely depreciated in value. But this depreciation of value is not based on the use of the land in its natural state but on what the land would be worth if it could be filled and used for the location of a dwelling. While loss of value is to be considered in determining whether a restriction is a constructive taking, value based on changing the character of the land at the expense of harm to public rights is not an essential factor or controlling."*

Thus, the court found that the "natural use" value of the property should be considered in determining whether or not there was substantial diminution of value.

In Golden v. Planning Board of Town of Ramapo,** the court reevaluated the effect of a comprehensive growth plan. The court found that the plan was necessary since present municipal services were inadequate. Despite a finding that the regulations were substantial and might prevent development for 18 years, the court found a valid exercise of the police power since the taking was not absolute. The court's analysis did not differ from Averne which was cited in support of the court's position. The real difference rested upon the court's determination that 18 years was a reasonable period of restriction.

These three cases represent a new approach to environmental problems in the context of the taking issue. The Just case may be especially significant, in that not only does it view regulation in terms of the "natural use" of the land, but its method of valuation of the property would permit greater purchases by the government.

The Ramapo decision may also be significant to the extent that courts will permit longer periods in which the owner may be deprived of any economic use of his property. These periods would hopefully permit more effective planning by zoning boards.

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*Id. at 23, Id. at 771.

**30 N.Y. 2d 359, 334 N.Y.S. 2d 138, 285 N.E. 2d 291 (1972).

While these decisions may promote environmental quality by prohibiting land uses that were previously permitted, they do not effectively force the internalization of land use costs. Rather, decisions like Just and Turnpike Realty merely deprive an owner of the use of his land, even in situations where the landowner could afford to pay the full costs of the land use. Similarly, Ramapo acts as a total deprivation during the planning years, even in those situations where the prospective land use is economically capable of paying its full costs.

2.2.3 Synthesis

An examination of both nuisance law and governmental regulations, as permitted by the courts today, allows a number of conclusions. First, there are significant barriers to an effective remedy in a private nuisance action. Legislative initiative may be able to reduce, if not eliminate, the major problems. However, once the court decides to grant relief, nuisance law is a relatively effective method of internalizing land use costs. Decisions like Boomer and Baldwin may provide an alternative to the sometimes harsh remedy of granting injunctive relief, and serve the purpose of internalizing most of the costs of land use.

Second, the ability of the government to protect the environment through police power regulations may be increasing because of the greater awareness of environmental problems. However, regulation, in the nature of total prohibition, seems ill-suited to an efficient economic system. Total prohibition does not discriminate between land uses capable of paying their total costs and uses which are incapable of doing so. Thus, traditional notions of property rights tend to perpetuate the externalization of costs and environmental deterioration.

2.3 Conclusions

The preceding legal analysis clearly demonstrates that neither the prevailing nor the emerging judicial interpretations of property rights are capable of producing an economically efficient resolution of all externality situations. Moreover, the economic analysis of Section 2.2 establishes the impossibility of developing any single mechanism for the internalization of externalities which will uniformly be the socially most desirable internalization mechanism in all externality situations.

Consequently, in any specific externality situation, the identification of the most appropriate internalization mechanism must rely upon a careful evaluation of the relative strengths and weaknesses of all feasible alternative internalization mechanisms which might be implemented in that situation. Recognizing that substantial differences exist between the characteristics of different externality situations, it is not unreasonable to expect that the application of this method of identifying the socially most desirable internalization mechanism for each particular externality situation will result in the simultaneous implementation of a variety of different internalization mechanisms in different situations.

3.0 A CRITIQUE OF TRADITIONAL LAND USE CONTROL MECHANISMS

Regulation of the use of private real property is practiced by virtually every political jurisdiction in the United States through the enactment and implementation of municipal zoning processes, subdivision regulations, building codes, eminent domain condemnation procedures, and various other mechanisms. This chapter investigates the administrative, economic, judicial, legal, and political problems which arise in the application of these land use control techniques.

Thus, Section 3.1 enumerates the practical difficulties which are encountered by municipalities in their development and utilization of municipal zoning techniques. In addition, this section describes the additional powers and complexities which are introduced into the municipal zoning process by the availability and use of complementary land use control mechanisms such as subdivision regulation and building codes. Section 3.2 similarly identifies the operational problems which arise in the exercise of the right of eminent domain to control the pattern of development of a municipality or a region. Finally, Section 3.3 contains some brief conclusions concerning the implications of this chapter relative to the continued usefulness of these traditional mechanisms as land use control techniques.

3.1 Municipal Zoning

3.1.1 The Nature of Municipal Zoning

The nature of municipal zoning may be best examined by evaluating the provisions contained in the Standard State Zoning Enabling Act.* But first, it is necessary to understand the purpose of an enabling act. It must be realized that local governments, without a grant of power from the state, have no power to zone. Even if a municipality is granted general police powers, the municipality may not have the power to zone.** Therefore, municipal governments need a specific grant of power to zone. This grant could occur through legislative or constitutional home rule provisions, but most often the power to zone is granted in an enabling act.

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*Standard State Zoning Enabling Act (107).

**See City of Searcy v. Robinson, 224 Ark. 344, 273 S.W. 2d 26 (1954) and Stevens v. City of Salisbury, 240 Md. 556, 214 A. 2d 775 (1964).

Every state has an enabling act, most of which are based on the Standard State Zoning Enabling Act (SZEA). The provisions of SZEA contain numerous limitations on the municipality's power to zone. Both the power granted and the limitations on it will be examined in order to help understand current zoning practices.

Section 1 of SZEA contains the general grant of power to restrict and regulate, among other matters, the size of buildings, the density of population, the location and use of buildings or other purposes. The power to restrict and regulate various matters is limited to "promoting health, safety, morals, or the general welfare of the community." Actions taken which do not promote these specific goals are not permitted under the enabling act.

The power to divide the municipality into districts is contained in Section 2. Within the districts the regulations must be uniform "for each class or kind of buildings throughout each district, but the regulations in one district may differ from those in other districts." This requirement for homogeneity within a district is sometimes the basis for holding certain zoning practices invalid, such as spot zoning, contract zoning, or conditional zoning.

Section 2 also contains provisions for regulating the use of buildings and land within a district. Three general uses have been developed: residential, commercial, and industrial. Within each general use, there are often a number of subclasses. Single family residential is considered to be the highest use of land and is exclusive, meaning that no other use is permitted. In the past, uses have been cumulative, permitting higher uses to locate in lower use districts. Recently, the concept of use districts has been changing, often making every district exclusive or by differentiating between uses through performance standards.*

The requirement that the regulations so far discussed must be contained in a comprehensive plan is presented in Section 3 of SZEA. The purpose of the comprehensive plan is to eliminate "haphazard or piecemeal zoning."* The result of this requirement is to invalidate many zoning decisions which are not pursuant to a comprehensive plan or are inconsistent with the plan.

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*See discussion, Section 3.1.5.3, infra.

While the comprehensive plan provides uniformity and stability, the act does permit the plan to be amended or changed, which introduces flexibility into the zoning process.** Further flexibility is provided in Section 7, where a board of zoning appeals may be created and empowered to "hear and decide special exceptions" and "to authorize upon appeal in specific cases such variances from the terms of the ordinance as will not be contrary to the public interest."***

Besides amendments, special exceptions, and variances, zoning ordinances almost always contain provisions which permit nonconforming uses to continue in a district. Permitting nonconforming uses to continue is another means of providing relief from the restrictions imposed by the comprehensive plan. In the case of a nonconforming use, a use which pre-exists the adoption of the zoning ordinance is permitted to exist, even though it would not be permitted to be developed under the zoning ordinance.

A number of restrictions on nonconforming uses have been created. An owner of a nonconforming use cannot enlarge the use. If the use is terminated, either by the owner or through destruction of the premises, the nonconforming use will usually not be permitted to be reestablished. Finally, the use may be forced to discontinue, because it creates a nuisance.****

Recently, zoning ordinances have forced the nonconforming use to discontinue after a certain period of time. This length of time depends upon the investment in the property and the ease of utilizing it for a conforming use. Thus, nonconforming uses of land where there is little capital investment and no impediment to using the land for a conforming use are given a short period of time to terminate. On the other hand, large, specialized buildings, which involve considerable investment and are not easily converted, are given much longer periods of time before they are forced to terminate.

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*See Standard State Zoning Enabling Act (107), Note 22.

**Standard State Zoning Enabling Act (107), Section 5.

***Standard State Zoning Enabling Act (107), Section 7.

****Hadachek v. Sebastian, 239 U.S. 394 (1915).

It can be seen that the power to zone gives the municipality the ability to restrict and regulate a wide range of activities. The scope of the municipality's power over land uses is even broader when viewed in connection with the municipality's control over building codes and subdivisions. Building codes permit the muncipality to regulate the construction of new buildings. Subdivision regulation is concerned with regulating a landowner's division of his property into parcels. Among other restrictions imposed on the landowner, he may have to dedicate some property for streets, school sites, or parks. Often the regulations go further and require the subdivider to build the streets and utilities required by the subdivision.

These powers, while extremely great, are not without their limitations. Often zoning boards may not act for any proper purpose or pursuant to a comprehensive plan. When disagreement exists between the municipality and the landowners over these or other matters, judicial review is required.

3.1.2 Judicial Review

Judicial review from decisions of the board of zoning appeals are specifically provided for in Section 7 of SZEA. Yet, judicial review is not limited to decisions of the board of zoning appeals. The courts can also review the validity of the entire ordinance or the validity of the ordinance as applied to a particular parcel of land.

When the plaintiff seeks to have the entire ordinance declared invalid, there are two possible arguments that may be raised. First, the ordinance may be challenged on the grounds that it does not conform to the requirements of the enabling act. Some of the deficiencies alleged are that the ordinance does not have a comprehensive plan, that the municipality is not divided into districts, or that there is not the required homogeneity within a district.

Second, the ordinance may be challenged on constitutional grounds. The constitutional arguments center on the ordinance's denial of either equal protection or due process. The equal protection clause usually is invoked when a municipality treats two uses in a different manner, even though there appears to be no real distinction between the uses. For instance, prohibiting drive-in restaurants while permitting enclosed ones or permitting public facilities like a warehouse or school and prohibiting private ones, are examples of situations where the equal protection clause may be violated.

The due process clause is often invoked when the zoning ordinance either does not further a legitimate purpose or when the ordinance is not related to the furtherance of a desired goal. Again, it must be stated that zoning regulations must be enacted to promote the health, safety, morals or general welfare. Regulations enacted for other purposes are not permissible. Furthermore, if the plaintiff can show that the ordinance does not promote a permissible objective, the ordinance will be declared invalid. It must be remembered that when the constitutionality of the ordinance is questioned, the plaintiff has the burden of proving that the ordinance is unconstitutional.

The landowner, instead of attacking the validity of the entire statute, may also challenge it as applied to his particular property. There are a number of reasons why the ordinances may be invalid in its application to a particular piece of property. These include situations in which ordinances deny the property owner any use of his land, impose heavy restrictions which are not required to serve a public purpose, or have no substantial relationship to the health, safety, morals, and general welfare. It should be recognized that many of these possible reasons for declaring an ordinance invalid are overlapping.

Judicial review of zoning ordinances and decisions by zoning boards protect the property owner from being subject to arbitrary and capricious regulation of his property. Resort to the courts, while expensive and time consuming, does result in the imposition of the limitations of the zoning power contained in the enabling act and the Constitution.

3.1.3 Techniques to Provide Flexibility in Zoning

Numerous techniques are permitted to give zoning the flexibility required in order to serve the individual property owner and the community. Each technique has certain legal criteria which must be met before the petitioner is entitled to the relief that he seeks. If the petitioner can demonstrate that the criteria are met, relief should be granted. In cases where the zoning board rules against the petitioner, review can always be obtained in the courts.

3.1.3.1 Rezoning

In Section 5 of SZEA, specific authorization is given to amend the zoning regulations. Normally, a petitioner requests that the zoning board rezone the property to a different zone, for example, from light industry to heavy industry. However, the petitioner may also ask the zoning board to consider adding a particular use to the zone, such as permitting an assembly plant which creates no noise or pollution to exist under the light industry zone, when it may have been permitted only in the heavy industry zone.

Zoning map amendments should be granted if the present zoning is not suitable for the property, where there is undue hardship, or when there has been a change of circumstances since the last zoning.

3.1.3.2 Conditional Zoning

Unlike contract zoning, where the zoning board and the property owner enter into a binding agreement, conditional zoning involves the property owner's restricting his use of his land, without receiving a binding promise from the board. Of course, it is the hope of the landowner that the board will voluntarily take the action that the property owner desires. The difference between contract zoning and conditional zoning makes conditional zoning a permissible technique for creating flexibility, while contract zoning is not permissible.* However, some conditional zoning situations may not be permitted, since they are considered to be spot zoning.**

3.1.3.3 Variances

Variances are probably the most widely used technique to provide flexibility in zoning. Unfortunately, along with its wide use, there is a great amount of misuse. Variances are permissible only when there is no adverse effect upon the public nor the surrounding neighborhood and only if there are particular characteristics of the property which make it deserving of special consideration. If the zoning would result in unnecessary hardship, a variance should be granted.

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*See discussion, Section 3.1.4.2, infra.

**See discussion, Section 3.1.4.1, infra.

3.1.3.4 Special Exceptions

Special exceptions, like variances, are permitted by SZEA. A special exception is similar to a variance in that a showing must be made that neither the public nor adjacent property owners will be unduly harmed. However, with a special exception there is not need to show that unnecessary hardship exists.

Probably the most distinguishing feature of special exceptions is the lack of guidelines. The lack of guidelines to control administrative discretion is often responsible for having the special exceptions ruled invalid.

3.1.4 Impermissible Zoning Techniques

Not all decisions made by a zoning board are permissible under the zoning ordinance. Affected property owners can challenge in the courts a board's decision to apply any of the flexibility techniques previously discussed. Furthermore, the board's decision can be challenged as being spot zoning or contract zoning, both of which are impermissible.

3.1.4.1 Spot Zoning

Spot zoning involves permitting a property owner to use his property for a use which is not permitted to neighboring parcels of land. Thus, the zoning board creates an "island" which gives the property owner benefits not enjoyed by neighboring landowners. Also involved in spot zoning is the granting of benefits to a particular landowner when it it not in the public interest to do so. Lastly, spot zoning does not conform to the comprehensive plan of the municipality.

The courts have concluded that spot zoning is invalid because it violates the comprehensive plan requirement, the need for uniformity within a district, and is contrary to the general welfare of the community.

3.1.4.2 Contract Zoning

Contract zoning is another impermissible technique that has sometimes been used by zoning boards. Contract zoning involves the negotiation of a binding agreement between the landowner and the zoning board. The landowner generally agrees to restrict the use of his land, while the zoning board agrees to zone the property for a particular use and to refrain from changing the zone.

Contract zoning often violates the same principles that were mentioned in spot zoning. Furthermore, the courts have concluded that it is not proper for the municipality to bargain away its future exercise of the police power.

3.1.5 Expanding Environmental Criteria for Zoning

3.1.5.1 Aesthetic Zoning

At one time it was thought that a zoning decision based on aesthetic considerations was not permissible under the enabling act. However, court decisions in some jurisdictions have found that aesthetic considerations are included within the general welfare provision of the enabling act. The leading case supporting this proposition is Berman v. Parker,* which is actually an eminent domain case. At least three states consider aesthetic considerations alone to be sufficient to justify a zoning decision, while a few more jurisdictions have stated that aesthetics may be a valid criterion, but have not directly ruled on the issue.**

The majority of states do not recognize aesthetic considerations as being part of the general welfare. This result may be due to the courts' hesitancy to impose one group's taste upon the remainder of the community.

3.1.5.2 Design Standards

Design standards or architectural controls are a form of aesthetic zoning which so far have not been widely accepted. There have been a few cases which have upheld ordinances restricting the architectural design of buildings.*** It would appear that zoning decisions based upon design standards are still in a very early period.

3.1.5.3 Performance Standards

Traditionally zoning maps were divided into zones that were classified according to the uses that were permitted or excluded from the zone. Recently these classifications have begun to be replaced by performance standards which instead of regulating the types of activities that may exist in a zone, regulate the amount of noise, odor, and other characteristics that are permitted in the zone. Thus, instead of excluding a steel mill from a light industrial zone, under performance standards the mill would be permitted if it met the particular performance requirements for the zone.

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*348 U.S. 26 (1954).

**See Masotti and Selfon (69), pp. 773-778.

***State ex rel Saveland Park Holding Corp. v. Wieland, 269 Wis. 262, 69 N.W. 2d 217 (1955) and Reid v. Architectural Board of Review, 119 Ohio App. 67, 192 N.E. 2d 74 (1963).

The advantage of these standards is the ability to more effectively control the characteristics of a zone, without resorting to a detailed list of particular industries that are permitted or excluded from the zone. Under performance standards any firm is permitted as long as it conforms to the zone's standards.

3.1.5.4 Population Density Controls

The enabling act specifically authorizes zoning decisions to control the population density. The two most widely used techniques for controlling population density are minimum lot sizes and minimum floor space. The minimum lot sizes have been held valid for lots as large as five acres. On the other hand, a number of courts have held that minimum lot sizes do not promote the health, safety, morals, and general welfare of the community and are thus invalid. Courts have been especially suspicious of minimum lot sizes which appear to be excluding poor persons from the community.

Minimum floor space has not received very favorable treatment with the courts. This is true probably because there appears to be no relationship between minimum floor space and the purposes of zoning. Even as a health purpose, the courts have been unwilling to uphold minimum floor space requirements.

3.1.5.5 Planned Unit Development

A planned unit development involves the taking of a parcel of land and developing it as a single entity. This may or may not include a combination of residential and commercial uses. The zoning board views the development as a single unit, not from the perspective of each individual lot. The zoning board may place limits as to the number of units that it will permit, which is a form of controlling population density. Usually, while the number of units are controlled, the type of structure and its location in the development is left to the discretion of the developer. This type of zoning has been upheld under the enabling act.

3.1.5.6 Flood Plain Zoning

Flood plain regulations have been added to many enabling acts. Generally, flood plain regulation involves restricting buildings which may block the water channel or controlling the intensity of use of the flood plain. Often the ordinances permit compatible uses such as golf courses or parks. However, some ordinances have been held to be unconstitutional takings, since they deprive the property owner of any reasonable use of his land. Normally, if a reasonable use is permitted and if there is a risk of flood damage if a building is constructed, the ordinance will be held valid.

3.1.6 Structural Limitations of Zoning

Although municipal zoning potentially is capable of having a substantial impact upon the pattern of development of real property, its influence is not unlimited.

3.1.6.1 The Negativity of Zoning

Zoning is essentially a negative control. It can specify only the types of development which may not be located in a particular area. It cannot specify the types of development which will be located in that area.* Thus, the zoning of a substantial portion of a municipality for industrial use will be unsuccessful in attracting industry unless economic conditions are conducive to industrial development at those locations.** Similarly, zoning is incapable of discouraging the withholding of land from development for speculative purposes. Consequently, it is not uncommon to observe the residential development of property which is relatively remote from an existing center of population prior to the residential development of equally suitable property which lies between these two locations despite the residential zoning of this intervening property. In fact, somewhat paradoxically, this pattern of development in many instances may be encouraged by the zoning of this intervening property. If this property has been zoned for very low density residential use through large-lot zoning practices, developers responding to a demand for high density residential development may be forced to bypass this property and, instead, to develop more remote property which is zoned appropriately for their purposes.

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*Witheford and Kanaan (117), p. 19.
**Siegan (106), p. 97.

Obviously, this pattern of intermittent development imposes both unnecessarily high public facilities costs upon all residents of the community and unnecessarily high travel costs upon, at least, the residents of the new residential development.*

3.1.6.2 Limited Retrospective Application

The extent to which municipal zoning regulations can promote the modification of nonconforming uses is limited. Although the zoning process can effectively prohibit the expansion of a nonconforming use, judicial concern for the protection of the private property rights of the owner of this use generally has produced a stipulation that the zoning process may require the elimination of a nonconforming use only in certain extreme circumstances, such as the voluntary discontinuation of the use for more than a specified period of time or the destruction of the use by natural causes. Although this stance has been relaxed recently in some jurisdictions by judicial decisions which permit municipalities to require the elimination of any nonconforming use after a reasonable amortization period, it remains true that the ability of municipal zoning to modify the pattern of development of developed areas is severely circumscribed. Consequently, the major potential of municipal zoning is focused upon control of the prospective development of vacant land.**

3.1.6.3 Limitations of the Police Power

The police power of the state is derived from the inherent right of the government to protect the health, safety, morals, and general welfare of the people. However, this power is limited by the constitutional restriction that private property may not be taken by the government without the payment of just compensation. This restriction imposes certain constraints upon the ability of municipal zoning to control the development of private property. For example, the zoning of private land for exclusive use as public open space must be considered a taking of land and, consequently, is not a proper or legal exercise of the police power. Similarly, the protection through municipal zoning of particular property with unique characteristics, such as flood plains, waterfronts, scenic areas, and recreational areas, may be determined to be unconstitutional takings of private property and, hence, inappropriate applications of municipal zoning. In these situations, the appropriate governmental action is the purchase of the property through either voluntarily negotiated agreement or, if necessary, the exercise of eminent domain condemnation.*

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*American Society of Planning Officials (2), pp. 34-35.

**Ellickson (41), p. 711; Lee (53), pp. 299-300; and Witheford and Kanaan (117), p. 19.

Municipal zoning also is occasionally constrained by the requirement that any exercise of the police power must be related to the protection of the health, safety, morals, and general welfare of the people. While the judicial interpretation of the general welfare is continually expanding, many land use control techniques which some communities have attempted to embody within their municipal zoning ordinances, such as view protection, architectural design control, and the prevention of premature development, have been disallowed by the courts as unconstitutional takings of property and violations of due process of law.**

3.1.7 Administrative Problems in Zoning

The procedural limitations which have been discussed in the preceding sections impose significant constraints upon the manner in which municipal zoning can control the use of real property. Moreover, the satisfaction of these procedural constraints is not sufficient to resolve all of the problems confronting a municipal zoning process. Consequently, in this section, the problems which arise in the administration of a procedurally sound municipal zoning ordinance are discussed.

3.1.7.1 Information Requirements

The initial establishment of a municipal zoning ordinance requires, first, the definition of the particular uses which will be permitted either generally or as special exceptions in each zoning classification; second, the specification of the height, area, and setback restrictions which will be applied to each permitted use in each classification; and, third, the determination of the size and the location of each zoning district to which each of these zoning classifications will be assigned throughout the municipality. In addition, if the zoning ordinance contains any performance or design standards, the specification of the precise nature and value of each of these criteria in each relevant zoning classification must be performed. Obviously, the volume of information which must be collected, processed, and assimilated in the performance of these tasks is immense.

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*American Society of Planning Officials (2), pp. 31-34.

**Ibid., pp. 48-49.

Moreover, the informational problems confronting the administrator of the zoning process do not terminate with the adoption of the zoning ordinance. The enforcement of this ordinance requires the continual monitoring of the land use activities of all property owners within the municipality. Once again, these monitoring requirements are much more stringent for municipalities which incorporate performance or design standards within their ordinances than they are for municipalities which rely upon more traditional zoning techniques.*

Finally, each request for a modification of the zoning ordinance -- a rezoning, a variance, or a special exception -- imposes additional information requirements upon the zoning process. Changes in the patterns of supply and demand for particular land uses must be identified and evaluated; the characteristics of both the property for which the modification has been proposed and the neighborhood of this property must be ascertained; and the implications of approving or denying the request for modification must be analyzed. To perform these tasks adequately, information must be obtained which describes present and prospective future patterns of public and private land uses within the municipality, adopted plans for future patterns of public and private land uses, and the attitudes and preferences of the residents of the community with respect to the proposed modification. This information must then be processed and evaluated in arriving at a decision concerning the approval or denial of the proposal. The difficulty and complexity of this decision-making process is described in considerable detail by Davis and Rueter,** whose analysis clearly indicates the magnitude of the information requirements confronted by the typical zoning administrator.

3.1.7.2 Administration by Lay Bodies

The assimilation and evaluation of all of the information described in the preceding discussion would constitute an extremely difficult task for a trained zoning practitioner. Yet, the administration of zoning

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*Siegan (106), pp. 96, 117-118; and Ellickson (41), p. 707.
**Davis and Rueter (29).

regulations is primarily the responsibility of lay bodies -- city councils, planning commissions, and boards of zoning appeal -- which, in general, are not equipped to perform this immense information processing task. Moreover, the magnitude and difficulty of this task is continually increasing as new, more flexible, more technically complex techniques to regulate urban development are devised and implemented. Yet, apparently undaunted by this complexity and convinced of their competence as decision-makers simply because they live in the community and either own or rent property, the members of these lay bodies regularly apply their intuition to the resolution of these complex land use and urban problems. Moreover, in arriving at their decisions, these lay bodies entrust to the political process the specification of land use policies which should be determined on the basis of thorough technical analysis. Obviously, this virtually complete reliance upon the common knowledge of laymen will produce solutions to land use and urban problems which are inferior to the solutions which sophisticated technical analysis is capable of attaining.*

3.1.7.3 Lack of Trained Staff

Although the problems associated with the lay administration of the zoning process could be ameliorated to some extent by the provision of substantial technical assistance to the members of the lay bodies, the provision of this assistance is severely constrained by the unavailability of trained professionals and technicians. The proliferation of governmental agencies and programs has increased the demand for skilled planners much more rapidly than the nation's colleges and universities have expanded the supply of planning professionals. Moreover, only a small portion of the graduates of planning programs choose land use regulation as a specialty. Instead, the majority of these graduates pursue more popular specialties such as urban design, new town development, and computer-based research. Finally, although many of the technical tasks associated with land use regulation do not require the completion of a graduate program in planning for their performance, few alternative programs for the development of these technical skills presently exist.**

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*American Society of Planning Officials (2), pp. 38-39.

**Ibid., pp. 40-41.

3.1.7.4 Conflicts with the Comprehensive Plan

Although the zoning enabling acts of most states require that zoning regulations must be developed in accordance with a comprehensive plan and despite the judicial criteria which have been established for the granting of changes in the zoning map, variances, and special exceptions, municipal zoning processes frequently approve zoning modifications which are inconsistent with adopted comprehensive plans and established judicial standards. For example, boards of zoning appeal have granted variances and special exceptions primarily on the basis of the benefit which will accrue to the owner of the property for which the variance or special exception has been requested. Moreover, these boards occasionally have granted variances which constitute substantial modifications in the zoning regulations which apply to particular areas when the boards have concluded that the legislatively established restrictions are no longer consistent with the best interests of the area. Thus, in effect, these administrative boards have been enacting legislative changes in municipal zoning ordinances despite their complete absence of any direct accountability to the residents of the municipality through the voting process.*

Similarly, municipal legislatures also have been known to approve modifications of the zoning map which are inconsistent with the stipulations of their own adopted comprehensive plans. Specifically, city councils have permitted the rezoning of single parcels and small enclaves of land for uses which are different from, and allegedly incompatible with, the uses which are permitted in adjacent districts.**

3.1.7.5 Contradictions Among Ordinances

The zoning ordinance is not the only governmental instrument which regulates the use of land in a municipality. The development and use of real property also is controlled by subdivision regulations, building codes, health codes, official maps, mapped street ordinances, and licensing ordinances. Since these various statutes normally are developed by the staffs of different municipal agencies, it is not uncommon for the standards which are established in one of these statutes to be inconsistent with the standards which are specified in one, or several, of the other statutes. This lack of coordination among the staffs of the various agencies unnecessarily complicates the problems confronting the property owner when he attempts to develop or use his property.*

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*This practice of boards of zoning appeal is severely criticized in Bryden (11), pp. 287-326. Conversely, it has been defended as a practical approach to introducing flexibility into the zoning process in Sussna (108), pp. 82-87.

**American Society of Planning Officials (2), pp. 25-29.

3.1.7.6 Lack of Intra-Governmental Cooperation

The failure of governmental agencies to coordinate their activities occurs not only when these agencies are formulating policies, but also when they are applying these policies in specific situations. Boards of zoning appeal frequently have granted variances which conflict with the intent of the zoning ordinance, the recommendations of the professional planning department, and the desires of the city council. Similarly, municipal legislatures themselves occasionally authorize the construction of public improvements in locations which are inconsistent with adopted land use plans and regulatory ordinances.**

This lack of coordination becomes more pronounced when one or more of the agencies which are involved in a potential conflict situation are not formally associated with the zoning process. Thus, the consequences of proposed zoning actions for traffic movement frequently fail to be recognized by the zoning process merely because this process does not consult with municipal traffic engineers or traffic planners either when it establishes zoning standards or when it reviews zoning proposals.***

Although inconsistencies of this type could be resolved to some extent by the requiring of coordination among these agencies by the municipal legislature (since the municipal transportation agency and all of the agencies in the zoning process are directly dependent upon the municipal legislature for their decision-making authority and their funding), this method of conflict resolution is ineffectual when the agency whose policies conflict with zoning regulations have decision-making authority and sources of revenue which are independent of the municipal legislature. Consequently, it is necessary to rely on voluntary cooperation to resolve conflicts between the municipal zoning process and such local, regional, and state agencies as school boards, water and sanitation authorities, urban renewal agencies, public housing authorities, and state highway commissions. The inadequacy of voluntary cooperation is clearly evidenced by the frequency with which these independent agencies authorize public improvement projects (i.e., school construction, water and sewer expansion, urban renewal projects, public housing developments, or highway construction) which conflict with adopted land use plans and the objectives of the zoning process.*

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*Ibid., pp. 47-48.

**Ibid., pp. 54-55.

***Witheford and Kanaan (117), p. 154.

A final source of intra-governmental conflict arises between municipal taxing agencies and the zoning process. The zoning process may attempt to control the growth of a community by imposing restrictive classifications upon particular parcels of land. Unless the public assessor assesses these parcels of land solely on the basis of their value in this restrictive use, it is difficult for the administrators of the zoning process to deny the rezoning of this property to a less restrictive classification on the grounds that the excessive taxes cause the more restricted use of the property to be uneconomic. Yet, public assessors often create precisely this problem by refusing to recognize the permanence of the restrictive zoning classification; assessing the property on the basis of a less restrictive, higher valued use; and thereby subverting the objectives of the zoning process.**

3.1.7.7 Lack of Dialogue Among Participants

The process of municipal zoning embodies a complex unit of legal precedents and restrictions, planning policies, economic forces, and political pressures. Yet, the typical lawyer, planner, developer, and legislator who is involved in this process makes few attempts to understand the objectives, the assumptions, or the analytical frameworks of the decision-making procedures which are employed by the other participants in this process. This general lack of understanding makes the establishment of a reasonable dialogue among the various participants in any zoning action extremely unlikely; and this absence of dialogue inevitably generates conflict in many situations in which cooperation or compromise otherwise could have been attained.***

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*American Society of Planning Officials (2), pp. 55-57.
**Ibid., p. 34.
***Babcock (3), p. 100.

3.1.7.8 Unintended Economic Impacts

Inherent in municipal zoning's power to control the use of land is the power to control the economic return to the owners of land. This power to influence the distribution of income creates numerous conflicts. Thus, the establishment of a zoning classification which makes a particular use nonconforming not only eliminates the possibility of any expansion of this use, but also creates for its owner a substantial degree of local monopoly power based upon the prohibition of the development of any competitive use of this type in the immediate vicinity. Clearly, in arriving at zoning decisions which involve the creation of nonconforming uses, anti-competitive tendencies of this type should be considered by the zoning process.*

Similar problems arise when zoning administrators attempt to plan for commercial expansion. If the zoning process desires to permit the development of only that volume of commercial facilities which it believes will be economically viable, it is likely that the number of proposed developments will exceed the number of developments which the zoning process desires to permit. Therefore, the zoning administrators will be required to select the particular developments in the total group of proposed developments which will be permitted to proceed. This decision will simultaneously grant economic returns to the potential developers whose proposals are approved and deny economic returns to the potential developers whose proposals are rejected. This undesired consequence constitutes a significant dilemma for the zoning administrators. However, if these administrators decide to avoid this dilemma by permitting the development of all proposed commercial facilities which are compatible with their immediate neighborhoods and create no substantial traffic problems, they inevitably will be confronted with the problem of determining the disposition of those facilities which fail to become economically viable.

This conflict between competing economic interests arises in its most emotional form whenever the zoning process is required to act upon a proposal for the development of a commercial facility which will compete with existing commercial uses in the central business district of the community. Approval of the proposal will deny economic returns to the owners of the established commercial uses in the central business district and will accelerate the decline of that district; while rejection of the proposal will deny economic returns to the owners of the property which is proposed for development and will withhold the availability of this proposed development from its prospective clientele. The process of land use regulation is inextricably involved with the redistribution of income and wealth.*

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*American Society of Planning Officials (2), pp. 24-25.

3.1.7.9 Delays in Response to Changes in Market Conditions

The pattern of demand for real property is inherently dynamic. Areas which previously have been appropriate for single-family dwellings become suitable for higher density residential development. Existing commercial districts decline while other areas become ripe for commercial development. In the absence of any restrictions upon the development of real property, these changes in demand patterns will relatively quickly be transformed into changes in land use patterns. However, when the establishment of these revised land use patterns is prohibited by existing zoning regulations, time and resources must be devoted to obtaining a modification of these regulations. Thus, a real property market which is constrained by land use regulations will respond less rapidly to changes in demand patterns than will an unrestricted real property market. Moreover, to the extent that a substantial accumulation of unfulfilled demand must exist before the zoning process will submit to a modification of its regulations, land development in zoned communities is likely to follow a pattern of long periods during which no development occurs interspersed with relatively short periods of intensive development activity. This phenomenon can create substantial inefficiency in the land development industry.**

3.1.7.10 Cost of Modifying the Ordinance

Obtaining a modification of the regulations which apply to a particular property invariably imposes substantial costs upon the owner of that property. Generally, he will be required to pay an administrative fee when he submits his request for rezoning. Moreover, even for minor changes in zoning, the property owner must devote considerable time and effort to presenting the details of his proposal informally to the professional planning staff and formally at a public hearing before the municipal legislature. In addition, for major zoning changes,

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*Babcock (3), pp. 70-73.
**Ellickson (41), p. 696.

"...large developers often wine and dine local officials, hire expensive consultants to make presentations at public hearings, initiate large public relations campaigns, and make judicious campaign contributions to key local officials."*

Finally, if all of these efforts fail to induce the desired modification of regulations, the property owner may decide to challenge the municipality's decision in the courts. However, zoning litigation is expensive. To convey a clear impression of the nature of the neighborhood in which the rezoning is being requested, expertly prepared maps and detailed photographs must be presented. Moreover, this demonstrative evidence must be supported by expert testimony by planners, appraisers, traffic engineers, and individuals who are knowledgeable about the particular type of development which is involved in the case. The fees charged by these experts are substantial. Yet, the value of the benefit which will accrue to the litigant if the rezoning is approved is not infinite. Hence, property owners frequently will either decline to challenge inappropriate local zoning decisions or restrict their expenditures for zoning litigation to levels which are insufficient to permit the preparation and presentation of adequate legal actions. The necessary consequences of decisions of this type is the prohibition of socially desirable developments and the misallocation of land uses to real property.**

3.1.7.11 Improprieties in Zoning Administration

The approval of any proposed modification of zoning regulations is expected to convey benefits upon the property owners who have requested this modification and, often, to impose losses upon other property owners. These expectations of benefits and losses provide incentives to these property owners to influence zoning administrators to make decisions which are favorable to their particular interests. Occasionally, this influence assumes the illegal form of the payment of graft to these local officials.***

Additional possibilities for impropriety arise when a zoning administrator has a personal interest in a proposed modification of regulations. Although it appears reasonable to expect any official who is confronted with a potential conflict of interest of this type to disqualify himself from participating in the resolution of the relevant zoning action, neither voluntary nor mandatory disqualification is universally practiced.*

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*Ibid., p. 698.

**Babcock (3), pp. 93-94.

***American Society of Planning Officials (2), p. 45; and Siegan (106), p. 98.

Impropriety may also arise in the pursuit of municipal objectives. Thus, to reduce public expenditures, a municipality might rezone to a more restrictive classification a parcel of land which is destined to be condemned for the development of a public project. This action, which will reduce both the fair market value of the property and the amount of compensation which the municipality must pay to the property owner, rarely will withstand judicial scrutiny if it is detected.**

Finally, impropriety may result from the arbitrariness and capriciousness of zoning administrators. The power to influence municipal zoning decisions incorporates within itself the ability to dispense favors. The exercise of favoritism almost inevitably will produce an unequal treatment by the zoning process of essentially identical requests for modifications of regulations.***

3.1.7.12 Conflicts Between Municipal and Regional Goals

The authority to control the use of real property through the application of municipal zoning procedures generally resides with the municipal government. Yet, many local zoning actions produce social and economic impacts which extend beyond the boundaries of the municipalities which take these actions. Unless these regional impacts are appropriately considered by the municipal zoning administrators, the land use pattern which is generated by this localized decision-making structure is extremely likely to be inefficient.****

3.1.7.12.1 Border Frictions

In the absence of coordination between the decision-making processes of the zoning administrators of adjacent municipalities, the land uses which are permitted under the regulations which apply to the property on one side of a municipal boundary may be incompatible with the land uses which are permitted (and, conceivably, have already been developed) under the regulations which apply to adjacent property on the other side of that boundary. This incompatibility may arise either from the adverse external effects which the former land uses directly impose upon the latter land uses or from the excessive demands which the former land uses impose upon public facilities which have been intended to serve only land use of the latter type. In particular, the first situation might occur if one municipality permits the development of light industrial uses which generate noxious odors on property which is adjacent to an area of high-class, low-density residential development in another municipality; while the second situation might be observed if one municipality permits the development of land uses which attract large volumes of traffic over streets which have been designed for only light traffic volumes in an adjacent municipality.*

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*American Society of Planning Officials (2), p. 46.

**Ellickson (41), p. 702.

***Siegan (106), p. 131.

****American Society of Planning Officials (2), pp. 7 and 51; and Geldon (44), p. 386.

3.1.7.12.2 Exclusionary Zoning

In some jurisdictions, municipal zoning is employed as a mechanism to exclude particular socioeconomic groups from establishing residence. The direct exclusion of racial minorities through the specification of zoning classifications on the basis of race uniformly has been overruled by the courts. However, municipal zoning administrators have successfully produced this desired result indirectly by enacting zoning regulations which effectively exclude low-income families and individuals from residing in their communities.

The zoning technique which is most frequently asserted to be a mechanism which has been employed for this purpose is the specification of unusually large minimum lot sizes in residential zoning classifications.** However, an early empirical study sponsored by the Urban Land Institute has concluded that, if the price per acre of land does not increase as the required minimum lot size decreases and if the subdivision regulations relative to public improvements are relaxed as the density of residential development decreases, the specification of large minimum residential lot sizes will not necessarily cause a substantial increase in the cost of residential construction.* This conclusion has been challenged severely by the results of a recent empirical study by Sagalyn and Sternlieb, who present statistical evidence which demonstrates that the common municipal practice of combining large minimum floor area specifications, large frontage requirements, and stringent street and public utility standards with large minimum residential lot size requirements will produce a substantial increase in the cost of residential construction.** Moreover, even in the absence of these complementary restrictions on residential development, the requirement of large minimum lot sizes reduces the total number of dwelling units which can be constructed in the municipality. If the demand for housing is unaffected by this regulation, this restriction of the potential supply of residences will increase both the market price of a residence and, consequently, the market price per acre of undeveloped land.***

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*American Society of Planning Officials (2), pp. 7-8 and 52; Reps (91), p. 59; and Siegan (106), p. 113.

**See, for example, American Society of Planning Officials (2), pp. 36-37 and 51-52; Babcock (3), pp. 92-93; Bronstein and Erickson (10), pp. 737-747; Ellickson (41), pp. 704-705; Fisher (42), pp. 129-148; Geldon (44), pp. 380-402; Urban Land Institute (111); and Sagalyn and Sternlieb (96).

It is also claimed that the exclusion of potential low-income residents has been effectively performed through the municipal prohibition of multiple-family residential developments and mobile homes**** and through the forbiddance of the establishment of industrial uses which might provide employment for low-income workers.***** Although all of these zoning techniques have been challenged in the courts on the basis of both their inconsistency with the general welfare and their unconstitutionality, the courts generally have been reluctant to sustain these challenges and, thereby, to deny the validity of municipal legislative actions -- despite the social desirability and potential economic efficiency of providing housing and employment for low-income groups somewhere in the region or, at least, the nation.

3.1.7.12.3 Fiscal Zoning

Municipal zoning administrators frequently sacrifice the attainment of the best pattern of land uses for the future in an attempt to improve the financial position of the municipality in the present. Some of these fiscal zoning actions are intended to increase municipal revenues; while others are designed to avoid or, at least, to reduce incremental public expenditures. Thus, a municipality might assign industrial or commercial zoning classifications to excessively large areas of land in an attempt to attract developments which will improve the tax base and increase employment in the community.* Conversely, it might establish large minimum residential lot sizes, limit or prohibit the development of multiple-family dwellings, restrict or forbid mobile homes, and specify excessively high zoning, subdivision regulation, and building code standards in order to impede the provision of low-cost or moderate-cost housing which increases municipal expenditures (especially educational expenditures) more than it increases municipal tax revenues. Clearly, the adoption of either of these measures, if successful, will reduce the tax burden of the existing residents of the municipality below the level which it will attain if the action is not taken and, consequently, may avert a politically undesirable tax increase. However, these policies also will impose increased tax burdens upon those other municipalities in which these industrial and commercial developments otherwise would have been located or in which the low-income and moderate-income families and individuals will now be forced to reside. Zoning actions which are locally desirable may be regionally inefficient.**

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*Urban Land Institute (111).

**Sagalyn and Sternlieb (96), pp. 64-70.

***Geldon (44), p. 392.

****Ellickson (41), p. 704; and Fisher (42), p. 130.

*****American Society of Planning Officials (2), p. 37; and Babcock (3), pp. 56-57.

3.1.7.12.4 Regional Resource Utilization Patterns

The actions taken by the zoning administrators of one municipality may have severe impacts upon the availability and utility of certain resources to other communities within the region. The permission of particular industrial uses which provide substantial employment in one municipality may generate serious air pollution or water pollution problems in neighboring jurisdictions. The prohibition of sand and gravel mining by a local legislature may severely restrict the availability and substantially increase the cost of these resources in nearby communities. Conversely, the improper control of the restoration of quarries and pits by one municipality may cause significant problems of environmental degradation in adjacent jurisdictions.***

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*American Society of Planning Officials (2), p. 35; Gillespie (46), p. 728; and Siegan (106), p. 140.

**American Society of Planning Officials (2), p. 69.

***Ibid., pp. 8-9 and 52.

Although all of these inter-governmental conflicts might be eliminated or, at least, ameliorated to some extent by the assignment of authority for the regulation of the use of real property to regional governments or agencies, this centralization of decision-making will substantially increase the intensity of many other administrative problems and will decrease the extent to which the zoning process permits self-determination of the resolution of land use problems by the people who are most directly affected by these problems. A choice must be made between the internalization of regional conflicts and the efficiencies of decentralized decision-making.*

3.1.8 Political Problems in Zoning

Theoretically, municipal zoning constitutes a coherent, consistent, and accessible system of comprehensible and practical regulations of the use of real property which are applied impartially to a community as a whole. However, this mechanism for reconciling competing claims to the use of land necessarily -- and rationally -- has been entrusted to the political process for its administration. This assignment of administrative authority inevitably makes the zoning process susceptible to a variety of competing political pressures.

3.1.8.1 Interest Group Influences

The adoption of a new zoning ordinance, the amendment of an existing zoning ordinance, or even the implementation of established zoning regulations will provide benefits to some individuals and will impose costs upon others. Recognizing this fact, individuals whose interests potentially will be affected by a particular zoning action will be motivated to form interest groups in an attempt to influence the decision which eventually will be made by the administrators of the zoning process. However, the likelihood that these motivations will be sufficient to produce the formation of an effective interest group is dependent upon the intensity and the dispersion of the interests which might be affected by the particular zoning action. Thus, a small number of strongly interested persons is much more likely to organize an effective interest group than is a large number of moderately interested persons in any particular situation -- despite the possibility that the total impact of the proposed zoning action upon the individuals who fail to organize effectively may be substantially greater than the total impact of this action upon the individuals who have succeeded in coalescing their interests.

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*Ibid., p. 9; Celdon (44), pp. 394-395; and Reps (91), pp. 59 and 63.

To the extent that the political process recognizes and responds more favorably to organized interest groups than it does to amorphous, unenunciated interests, this bias in the pattern of interest group formation will produce a lack of impartiality in the zoning process and inefficiency in the allocation of activities to land. This phenomenon provides a convincing explanation for the intense activity and substantial effectiveness of local interest groups in inducing zoning actions which promote their parochial interests at the expense of the more dispersed interests of the community as a whole.*

In addition, the complexity of the typical municipal zoning process places a strong emphasis upon technical and political expertise. Thus, an interest group whose leaders are knowledgeable about the intricacies of the administrative structure of the zoning process and aware of the political commitments of the zoning administrators and municipal legislators is more likely to obtain favorable zoning actions than is an interest group whose leaders lack these qualifications.**

Although the compromise decisions which emerge from a process which effectively excludes unorganized, politically ignorant, or politically unskilled groups may be entirely satisfactory and appropriate to the legislative procedures of a representative society, they may be unacceptably inefficient as standards for the control of real propety.***

3.1.8.2 Political Favoritism

An individual who is personally acquainted with and has access to the decision-makers within the zoning process can obtain both valuable technical assistance in the preparation of his appeals to that process and, in some cases, direct favors from the administrators of that process. This accessibility provides this individual with a substantial comparative advantage in obtaining desired zoning actions. Clearly, this political favoritism is not necessarily consistent with the attainment of efficiency in the regulation of the use of land.****

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*Makielski (65), p. 19; and Siegan (106), p. 138.
**Makielski (64), and Makielski (65), pp. 17-18.
***Siegan (106), p. 132.
****Siegan (106), p. 131.

3.1.8.3 Implications of Majority Rule

If the elected officials who participate in the administration of the municipal zoning process desire to retain their positions, their actions must please at least a simple majority of their constituency. Therefore, a rational political decision-maker will only support those zoning actions which will increase the number of votes which he will receive in his next election campaign. As a consequence of this political incentive, a democratic political process occasionally may impose zoning regulations which are overly protective of existing land uses and, hence, impede the transition of the real property market toward more efficient land use configurations.*

In addition, if a particular group of individuals consistently support the minority position in zoning actions, the democratic political process may systematically generate zoning decisions which are contrary to the interests of these individuals. Unless personal preferences are sufficiently diverse to permit shifting coalitions to organize in support of different zoning proposals, there is no reasonable assurance that the zoning process will at some time provide benefits to each member of the community.**

3.1.8.4 Political Delay

The complexity of the typical municipal zoning process presents numerous opportunities for zoning administrators to delay the processing of any particular zoning action. Moreover, any delay which is introduced into the processing of a zoning proposal is likely to impose substantial costs upon the developer who has initiated the proposal. Consequently, municipal decision-makers are frequently alleged to employ these opportunities for delay to induce developers to agree to restrictions upon their right to develop their property, such as the compulsory dedication of property for schools and parks or the execution of a covenant constraining the possible future use of the property. Although many of these restrictions will be invalidated by the courts if they are challenged, the high cost of zoning litigation and the realization that the municipality can introduce further delays into the development of the property at subsequent stages of the regulatory process (e.g., building permit approval, health code inspection, occupancy permit approval, etc.) generally discourages developers from exercising their right to request judicial review.*

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*Davis (27).

**Geldon (44), p. 385.

3.1.9 Economic Problems in Zoning

The primary economic justification which has been advanced for the imposition of municipal zoning restrictions upon real property markets is the allegation that there exists between various types of land uses certain uncompensated external economic effects which prevent the unrestricted market from functioning in a manner which is consistent with the attainment of economic efficiency. Therefore, it is asserted that the political process must intervene in this market to protect property owners against the potential erosion of their wealth. Moreover, it has been demonstrated that, within the context of a static analysis, a market mechanism which is perfectly regulated according to the basic zoning strategy is capable of attaining economic efficiency. In addition, with relatively obvious restatements of initial conditions, this analysis can be extended to demonstrate the potential economic efficiency of municipal zoning in a dynamic context.**

3.1.9.1 The Empirical Validity of Zoning

Several recent studies*** have empirically investigated the theoretical economic justification for zoning by attempting to isolate systematic statistical relationships between the market values of residential properties and the characteristics of the neighborhood surrounding these properties. Uniformly, these studies have failed to isolate empirically the external effects which the relevant zoning ordinance implies should exist. Consequently, on the basis of the presently available evidence, it appears doubtful that the traditional economic rationale for the adoption of municipal zoning regulations is justifiable.

In addition, one of these studies has also investigated the relationship between the zoning classifications which have been assigned to various residential properties and the market prices of those properties.**** This investigation has concluded that the existing assignment of zoning classifications to residential properties has not had any statistically significant effect upon the market prices of the properties.

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*Babcock (3), pp. 53-54 and 90.

**Davis and Whinston (30).

***Crecine, Davis, and Jackson (21); Maser, Riker, and Rosett (67); and Rueter (95).

****Maser, Riker, and Rosett (67).

That is, there is no evidence that zoning, as it actually is applied, restricts the quantity of land which can be devoted to any particular use sufficiently to cause this type of land to become relatively scarce and, hence, to elevate its market value. If this conclusion is generally valid, it raises serious questions about the potential effectiveness of municipal zoning as a land use control technique.

3.1.9.2 Inefficiency of Mandatory Controls

The compliance of property owners with zoning regulations is mandatory. Potential violators of these regulations are denied building permits or occupancy permits; while existing violators may be forced to comply with the stipulations of the zoning ordinance through the issuance of mandatory injunctions. This reliance upon mandatory compliance as an enforcement mechanism might promote economic efficiency in the regulation of the use of land if there is reasonable certainty that the restrictions which are specified in the current zoning ordinance are precisely those restrictions which will optimally control the interdependencies which exist in the real property market. However, the previously discussed administrative inefficiencies, political influences, judicial constraints, and economic problems inherent in the management of the zoning process strongly suggest that this situation generally will not prevail. Rather, it appears likely that the zoning regulations which have been established in any typical municipality will generate, or at least will fail to ameliorate, numerous economic inefficiencies in the market for land.

Under these circumstances, insistence upon mandatory compliance with zoning regulations is tantamount to requiring the continuation of these economic inefficiencies. It appears preferable to attempt to develop an enforcement mechanism for the zoning ordinance which will encourage deviations from strict compliance with the provisions of this ordinance if these provisions are inconsistent with the attainment of economic efficiency. For example, this objective might be successfully promoted if the penalty for violating the provisions of the zoning ordinance were limited to the payment of a fine or an award for damages which approximates the nuisance costs which result from the lack of compliance. Thus, if the value to a property owner of violation of an inefficient zoning regulation exceeds the amount of this fine, the property owner can choose to violate this regulation, pay the fine, and increase the economic efficiency of the real property market.*

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*Ellickson (41), pp. 706-708.

3.1.9.3 The Desirability of Compensation

The enactment of a zoning regulation which prohibits the establishment of a land use for which there is an effective demand upon a particular site will adversely affect the value of that site. Similarly, the approval of a modification of the zoning ordinance which will permit the development of a land use on one property which will generate adverse economic effects for neighboring properties will reduce the market values of these neighboring properties. However, in general, the courts do not require the payment of compensation to those property owners who suffer a decrease in their wealth as a result of these exercises of the police power. Yet, the absence of a judicial requirement of the payment of compensation to property owners whose wealth is adversely affected by the implementation of the zoning ordinance does not necessarily imply that this payment of compensation is socially or economically undesirable. Rather, it is conceivable that the payment of compensation will promote the attainment of valid social objectives by ameliorating inequities which arise from the impact of the enactment of zoning regulations upon the prevailing distribution of wealth.* Moreover, it is possible that the payment of compensation will induce greater economic efficiency in the regulation of the use of real property by causing the administrators of the zoning process to recognize the costs which are imposed upon individual property owners when particular zoning restrictions are imposed upon their properties.** Obviously, these potential benefits which might arise from the payment of compensation must be compared with the costs of establishing and administering a compensation system in determining the overall social and economic desirability of adopting this policy.

3.1.9.4 The Consequences of Non-Zoning

Perhaps the strongest indication that municipal zoning is not universally necessary as a mechanism for the regulation of the use of land is provided by the experience of Houston, Texas -- the only major city in the United States which has not adopted a comprehensive zoning procedure. Interdependencies between private land uses are controlled in Houston by voluntarily negotiated deed restrictions and private covenants, which are legally binding for a specified period of time and usually are automatically renewed unless they are modified by a majority of the property owners who have been bound by the restrictions.

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*Davidson (26), p. 44; Penny (84), pp. 261-266; and Reps (91), p. 63.

**Davidson (26), pp. 47-48.

The pattern of land uses in Houston is virtually indistinguishable from the land use configuration of most major zoned cities. Economic forces produce a natural separation of land uses. The rate of appreciation of the values of residential properties in Houston appears to be equivalent to the appreciation rate of these values in other cities. In fact, the only minor differences which have been observed are a greater availability of multiple-family residential developments and lower apartment rents, a greater intensity of commercial development adjacent to major thoroughfares, and a higher incidence of non-residential land uses in residential neighborhoods in Houston relative to other cities.*

Thus, to the extent that similar patterns of development might have evolved in other municipalities in the absence of the imposition of any zoning regulations, the enactment and implementation of zoning processes may have been, at best, superfluous and, at worst, extremely wasteful of society's scarce resources. Yet, it is important to recognize that Houston's pattern of development undoubtedly has been influenced by its location on a flat plain which imposes no geographical limitations upon its expansion.** Consequently, it is possible that voluntarily negotiated restrictive covenants will constitute inadequate land use control mechanisms in municipalities exhibiting topographic conditions which differ substantially from those of Houston.

3.2 Eminent Domain

3.2.1 The Nature of Eminent Domain***

Eminent domain is the right of public authority to appropriate private property with or without the consent of the owner of the property. This sovereign right is possessed by both the Federal government and the individual state governments, although the Federal prerogative takes precedence over the state prerogative when both governments attempt to exercise the power of eminent domain over the same property at the same time. Moreover, although the right to initiate eminent domain proceedings formally resides only with the Congress or the state legislatures, this right can be -- and frequently is -- delegated to administrative agencies, which may include municipalities, public corporations, private corporations, and private individuals. This delegation of power generally is motivated by the complexity of the process of acquiring property and must be based upon public necessity. The rights which are granted may be restricted by any qualifications which the delegating legislature considers to be appropriate.

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*Geldon (44), pp. 399-400, and Siegan (106), pp. 75-129.

**Geldon (44), p. 400.

***The material presented in this section has been abstracted from Edens (40), pp. 314-316, and Lawrence (57), pp. 1-8.

The only substantive limitations which are imposed upon the exercise of the right of eminent domain at the Federal level are embodied in the provisions of the fifth amendment to the Constitution, which declares: "...nor shall private property be taken for public use without just compensation." Thus, before any authorized agency can exercise its right of eminent domain, the Constitution requires that this agency must demonstrate both that the property which it is acquiring will be devoted to a public use and that just compensation has been paid for the property. Moreover, the constitutions of approximately half of the states also require the payment of compensation when private property is damaged, but not taken, by an action of an authorized agency.

In addition to these substantive limitations, certain procedural restrictions are imposed upon the exercise of the power of eminent domain by the constitutional requirement of due process of law. In particular, the courts have broadly interpreted this requirement as an obligation upon them to guarantee that the purpose of the acquisition of private property is the provision of a public use, that the compensation which has been offered for this property is adequate, that any delegation of the power of eminent domain is valid, that the individual who owns the property which is being acquired has received appropriate notice prior to the taking, and that this property owner has been given an opportunity to be heard before a lawful public tribunal which employs procedures which do not violate his fundamental human rights.

The specific processes which have been developed by the Federal government and the various state governments to satisfy these procedural restrictions are determined by the statutory laws of these jurisdictions and, consequently, differ among jurisdictions. Nevertheless, these eminent domain processes can be classified roughly into two mutually exclusive categories: those processes which acquire property through the issuance of administrative orders and those processes which acquire property through the proclamation of judicial decrees.

The essential practical distinction between these two types of processes consists in the relative timing which they apply to the acquisition of possession of the property and the adjudication of the terms of this acquisition. In administrative processes, possession precedes adjudication. Thus, upon the satisfaction of certain specified conditions, the agency which desires to condemn a particular property can acquire title to that property. Only after this action has been completed is the previous owner of the condemned property permitted to challenge either the validity of the condemnation of his property or the adequacy of the compensation which has been offered for this property. Conversely, in judicial processes, adjudication before a trial court precedes the condemnation of any property. However, the agency which has initiated the eminent domain proceeding is permitted to acquire title to the property immediately upon the issuance of an order of condemnation by the trial court and, hence, prior to the conclusion of any appellate proceedings before tribunals other than the trial court.

3.2.2 The Public Use Concept

The legal justification for every exercise of the right of eminent domain is that property which is acquired will be employed for a public use. Consequently, the primary legal objection which can be raised to challenge any particular application of the power of eminent domain is that the proposed utilization of the condemned property does not constitute a public use. The difficulty which confronts the courts when they are asked to adjudicate an objection of this type is the interpretation of the concept of public use.

There are two basic judicial interpretations of this concept. The narrow interpretation maintains that a public use exists only when the public is entitled by right to use or to enjoy the use of the property which has been condemned; while the broad interpretation declares that the condemnation and subsequent use of a property is merely required to promote the public benefit or common good to a perceptible degree in order to be considered a public use.* Initially, the more restrictive narrow interpretation of the concept of public use predominated in the courts of this country and, consequently, the application of the right of eminent domain was severely constrained. However, in more recent years, the judicial interpretation of this concept has been broadening to the extent that the government now is permitted to condemn property for purposes which previously have been prohibited. In particular, broader exercise of the public power of eminent domain has been allowed in the acquisition of property for purposes of urban renewal, conservation of natural resources, and the preservation of open space.* Moreover, its application has been permitted in forms other than the acquisition of property in fee simple, such as condemnation and subsequent leasing of property to private individuals, temporary acquisition and ensuing resale of property to private individuals subject to the provisions of a development plan, procurement of development rights or easements, and acquisition of access rights to property.** However, there are still several areas in which the application of the power of eminent domain might be socially desirable, but relative to which courts have not established clear precedents.

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*Boyce (8), pp. 299-300; Lawrence (57), p. 8; and MacAffer (63), p. 57.

3.2.2.1 Excess Acquisition

Excess acquisition constitutes acquisition through the exercise of the right of eminent domain of more property than is actually necessary for the physical development of a public improvement. Thus, this acquisition is incidental to the provision of the public improvement by the condemning agency. Yet, it is undertaken by this agency for the purpose of holding, selling, leasing, or exchanging the "excess" property in promotion of the public interest. Three distinct alternative justifications for this application of the right of eminent domain have been advanced.

First, it is asserted that the acquisition of precisely that property which is required for the development of a particular public improvement frequently will result in the creation of remnant parcels of land which are inappropriate for any reasonable use. The acquisition of these remnants by the public authority provides an opportunity to replot them into usable parcels which can subsequently be resold. The courts have generally accepted this justification for excess acquisition whenever it has been applicable.

Second, it is argued that the inappropriate development of property adjacent to a public improvement can adversely affect the efficiency with which this public improvement can be used. Consequently, it is proposed that the right of eminent domain should be exercised to acquire this adjacent property, which can subsequently be sold or leased subject to restrictions which will protect the public improvement from adverse external effects. The receptivity of the courts to this potential justification of excess acquisition has been mixed. In some instances, the courts have objected to the right of the public authority to sell the excess property which it has acquired. Yet, the courts have also permitted the use of excess acquisition for aesthetic purposes in several past decisions.

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*Boyce (8), pp. 300-301.

**Witheford and Kanaan (117), p. 11.

Finally, it is contended that, since the development of public improvements may increase the value of adjacent properties, the excess acquisition and subsequent resale of these adjacent properties should be pursued to obtain for the public authority this incremental value and, hence, to recoup some of the costs of providing the public improvement. The courts generally have rejected this potential justification of excess acquisition whenever it has been challenged. However, the recent use of excess acquisition solely for recoupment purposes on TVA projects has not yet been challenged and, hence, is evidently being tolerated by the public.*

3.2.2.2 Advance Acquisition

Improved urban land normally is developed with extremely durable and expensive capital improvements which determine the character of the services which will be rendered by this land for extensive periods of time. The substantial expense associated with the modification of these improvements by demolition or conversion introduces a significant element of irreversibility into the process by which uses are allocated to parcels of urban land. This irreversibility would have few implications for the public regulation of the use of urban land if it were not true that particular sites offer very specific locational advantages for certain public facilities. However, since the efficiency of some public facilities is not independent of the location of these facilities, it may be desirable for the government to acquire particular parcels of land in advance of the formulation of any specific plans for the development of these parcels in order to preserve these sites from premature private development in other, less valuable uses.

Admittedly, the prospect of premature private development exists for both properties which are especially appropriate for certain public uses and for properties which are particularly suitable for specific private uses. However, this prospect is substantially greater for land which is uniquely qualified for the development of a public facility because the manner in which the government's power of eminent domain determines the value of a parcel of land effectively discourages property owners from refraining from developing in private uses properties which they recognize will eventually have higher values in public use. Specifically, the compensation which is paid when a parcel of land is condemned by the government is set equal to the fair market value which that parcel can be expected to attain as a result of competition among private land users. Since the property owner is offered no opportunity to obtain any of the incremental value which his property will earn when it is developed in a public use, he has no incentive to take this incremental value into account in his decision to develop this property. Consequently, he will rationally choose to develop his property in a private use -- and, hence, to earn short-term returns from this use -- despite his recognition that his adoption of this strategy will impose incremental demolition or conversion costs upon the government when his property eventually is condemned.

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*Boyce (8), pp. 294-295 and 301.

Acknowledging this tendency of urban property markets to promote intertemporal inefficiency in the allocation of uses of land, the desirability of permitting the government to purchase private property in voluntary market transactions in advance of specific plans for the use of this property becomes obvious.* Moreover, to the extent that the compensation costs associated with the exercise of the right of eminent domain are substantially lower when private property is acquired prior to its development for a private use than when it is acquired after this development, the application of the right of eminent domain to the advance acquisition of property also appears to be desirable.

3.2.2.3 Inverse Condemnation and Environmental Pollution

Air and water pollution generate external effects which may significantly decrease the market values of adversely affected properties. Yet, unless the owners of these properties can identify the sources of this pollution, eliminate all alternative causes of the reduction in property values, substantiate the magnitude of this reduction, and apportion this magnitude among the various sources of pollution, it will be impossible for these property owners to recover damages through private legal actions alleging nuisance, ultrahazardous liability, or negligence. Moreover, when the source of the pollution is a public activity, private legal actions are totally precluded by the traditional immunity of government from suits in tort. In situations like these, inverse condemnation actions may represent desirable mechanisms to provide compensation for the adverse external effects which are generated by environmental pollution.

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*Shoup (105), pp. 147-205.

As the title suggests, inverse condemnation actions constitute inversions of ordinary condemnation actions. With ordinary condemnation, the authorized condemning authority initiates a proceeding which requests the condemnation of a particular property for a public use and asks the trial court to determine the just compensation which should be paid for that property. Conversely, with inverse condemnation, the owner of a particular property files a complaint against an authorized condemning authority which alleges that this authority has, in fact, appropriated or damaged his property without paying him the just compensation to which he is entitled.*

However, the courts generally have ruled that, before any reduction in the market value of private property which has been caused by the generation of environmental pollution by a public facility will constitute the basis of a successful inverse condemnation action, it must be demonstrated that these adverse external effects were foreseeable and that the environmental pollution which causes these effects directly encroaches upon the private property. Similarly, before a successful inverse condemnation action can be based upon the reduction of private property values which is caused by the pollution generation activities of a group of private sources which is so large that it is impossible to apportion the responsibility for this pollution among the individual sources, the courts must rule either that the state government has an affirmative duty to abate environmental pollution or that the state, by chartering a corporation or licensing a business whose operations cause adverse external effects which constitute an appropriation of private property, has effectively delegated to that corporation or business the power of eminent domain. Thus, in the absence of favorable court rulings in the future, inverse condemnation will fail to constitute an effective mechanism for the amelioration of many of the adverse effects of environmental pollution despite its potential desirability for this purpose.*

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*Lindas (62), p. 125.

3.2.3 The Concept of Just Compensation

The fifth amendment of the Constitution requires that the owner of any property which is appropriated through the exercise of the right of eminent domain must receive just compensation for this property. The objective of this requirement is to provide to the property owner precisely that amount of income which will place him in the same position which he would have occupied if his property had not been condemned. In attempting to attain this objective, the courts have been confronted with the problem of establishing standards for the determination of this amount of income.

Correctly, the courts have rejected the value which is attached to the property by the condemning agency as the appropriate standard. This value constitutes the amount of income which must be surrendered by the condemning agency to place that agency in the same position which it would have occupied if it had not appropriated the property. Clearly, if the condemnation of the property promotes economic efficiency, this valuation generally will exceed the amount of income which the courts desire to ascertain.

Somewhat less justifiably, the courts also have rejected the value which is attached to the property by its previous owner as an appropriate standard for the determination of just compensation. Admittedly, the direct acceptance of this value as the amount of income which should be paid to the owner of condemned property will usually result in the payment of excessive compensation to that individual because this value fails to account for the existence of any substitutes for the property which has been condemned. However, this value does provide a considerable amount of valuable information about the personal loss which the property owner sustains when condemnation occurs. Hence, it appears desirable to include this value as one indicator of the appropriate magnitude of adequate compensation.

Yet, instead of employing either of these value measures in their determination of just compensation, the courts have chosen to rely exclusively upon the value for which the property might be expected to be exchanged in the market as their appraisal standard. Conceptually, this value represents the price which will be voluntarily negotiated for this property by a hypothetical seller who is willing but not obligated to sell and a hypothetical buyer who is willing but not obligated to buy.* Although this amount of compensation will be sufficient to place the property owner in the same position which he would have occupied if his property had not been condemned if all property owners have equal access to the mortgage market, if there are other properties which are considered by the property owner to be perfectly equivalent to the condemned property and are available to him at a price equal to the amount of compensation, and if there are no costs associated with relocating from the condemned property to any other property, these conditions generally will not be satisfied in any realistic situation. Consequently, the judicial standard for the determination of just compensation will systematically award compensation which is inadequate to return the property owner to the position which he occupied prior to the condemnation of his property. In effect, application of this judicial standard causes the property owner to be compensated only for the value of the property which has been appropriated and, hence, fails to compensate him adequately for all of the damages which the appropriation of his property has imposed upon him.**

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*Kramon (55).

3.2.3.1 Highest and Best Use

Fortunately, in implementing this judicial standard, the courts have adopted the general principle that a proposed land use which is higher and better (i.e., capable of earning a greater return for the property owner) than the presently existing land use constitutes a legitimate basis for estimation of the value of the property, provided that the proposed use is not excessively remote or speculative. Since the market value of a parcel of land is determined not only by the returns which are earned by its present use, but also by the returns which are expected to be earned by its potential future uses, it clearly would be inappropriate to estimate the amount of compensation which should be paid for a property solely on the basis of the value which this property would possess if it were retained in its present use perpetually.

Yet, the necessity of considering the potential future use of a property imposes several obvious problems upon the courts. In particular, in evaluating any particular property, not only must the courts forecast the expected future market demands for the use of this property, they also must analyze the existing legal constraints upon the initiation of these potential future uses and predict the possibility of future legislative or judicial relaxation of these constraints. Thus, the essential consideration of the potential future use of a property unavoidably introduces undesirable elements of subjectivity, inconsistency, and error into the determination of just compensation.* Moreover, even if these practical problems can be successfully managed, the established judicial standard remains inadequate as a mechanism to compensate property owners for all damages which are imposed upon them by the condemnation of their property.

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*Klein (54), p. 9; Lawrence (57), pp. 16-18; and Sengstock and McAuliffe (104), pp. 190-191.

**Klein (54), p. 10.

3.2.3.2 Displacement Costs

The exercise of the right of eminent domain to appropriate a particular property may impose direct costs upon the owner of this property which will not be reflected in the objectively determined market value of the property. First, the transferring of legal title to the property to the state may cause the owner to incur several miscellaneous costs, such as recording fees, title transfer taxes, penalties for the prepayment of a mortgage, and loss of prepaid property taxes. Historically, the property owner has been unable to recover these costs from the condemning agency, although some recent legislation, such as the Federal Aid Highway Act of 1968, provides for their compensation.**

Second, because the judicial standard for the determination of just compensation estimates the value of a property on the basis of a hypothetical exchange between an average buyer and an average seller, it fails to recognize any special circumstances which might be associated with the manner in which the owner of the property which is being condemned has originally purchased this property. This failure to recognize special circumstances may impose substantial displacement costs upon some property owners. In particular, low-income buyers who can afford to pay only very low down payments generally are considered to be poor credit risks and, consequently, are required to pay inflated prices for property. When a property which has been purchased at an inflated price is condemned, the owner of this property frequently loses any equity which he has established and may be required to pay a deficiency judgment in addition to this compensation award in order to settle his remaining indebtedness on the property. Despite a recent court ruling that the holders of mortgages on property are entitled only to payment of the realistic present value of their rights to future payments discounted at a rate which appropriately accounts for the credit risk,* few courts apply this alternative valuation approach. As a result, exercise of the right of eminent domain may cause many property owners to lose equity which they have acquired in property which is condemned.**

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*Berger (5), pp. 87-91.

**Bosselman, Newsom, and Weaver (7), pp. 9 and 11.

Finally, since plans to develop public improvements usually are announced substantially earlier than property is condemned for the development of these improvements and since in most states the date for which fair market value is determined is the date on which the condemning agency initiates court action to appropriate the property, the owner of condemned property may suffer losses as a result of the delay between the announcement of a project and the acquisition of his property. Specifically, he is likely to be damaged if, for personal reasons, he is required to dispose of his property at a depressed price before it is condemned. Similarly, if his property is income property, he may lose rental income if any of the leases on this property expire prior to the date of condemnation. Finally, since the knowledge of the impending public project will both encourage emigration from the neighborhood and encourage the deterioration of the properties in the neighborhood, market value of any property in this area is likely to decline during the period between announcement of the project and the appropriation of the property. Since the compensation which is paid for a property is determined at the date of acquisition of the property, all of this decrease in market value will be borne by the private property owner. Moreover, under either current eminent domain or supplementary legislation, none of these losses can be recovered from the condemning agency by the property owner.***

3.2.3.3 Relocation Costs

The relocation of a family or business may require a substantial expenditure of time and resources and, hence, may impose substantial costs upon the family or business which is forced to relocate. These costs include the cost of searching for replacement facilities; the transportation, food, and lodging costs incurred while performing the actual movement; and any incidental costs of acquiring replacement facilities, such as costs of appraisal, survey, title examination, and closing for purchasers of property or security deposits for utility service or advance payment of rent for renters. In addition, some families may incur certain indirect costs, such as the loss of support from family members who live near to their previous residence; while businesses may suffer a loss of business or goodwill which will permanently affect the profitability and value of their enterprise. Moreover, some businesses, primarily small, marginal retail establishments or firms with special licensing or zoning requirements, may fail to relocate successfully and, hence, may cease to exist. Finally, both families and businesses often discover that the cost of equivalent replacement facilities exceeds the compensation which they have received for their condemned property. This situation is especially likely to arise when the public project for which their property has been appropriated has significantly reduced the total supply of facilities at a particular price level.

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*Mayme Riley vs. District of Columbia Redevelopment Land Authority, 246 F.2d 641 (D.C. Cir. 1957).

**Bosselman, Newsom, and Weaver (7), pp. 9 and 11; and Dagen and Cox (24).

***Bosselman, Newsom, and Weaver (7), pp. 9-11.

Traditional notions of just compensation do not provide for the recovery of any of these relocation costs, although some supplementary legislation does authorize the payment of compensation for actual moving costs and for the increased cost of replacement facilities. However, even this legislation permits the payment of compensation only to those families, businesses, and individuals who relocate after their property has been appropriated. Thus, those who move after the announcement of a project but prior to condemnation of their property are required to pay all of their relocation expenses.*

3.2.3.4 Employment Costs

A resident who is displaced by an exercise of the right of eminent domain may be unable to locate a new residence which is as near as his previous residence to his place of employment. If this occurs, he will be required to pay increased commuting costs to reach his place of employment. In fact, if the location of his new residence makes it impossible for him to reach his place of employment, he may actually suffer a loss of employment as a result of his relocation. Similarly, if his place of employment has also been condemned and has failed to relocate, loss of employment will result. Neither current eminent domain law nor supplementary legislation provides for the payment of compensation for these costs.*

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*Bosselman, Newsom, and Weaver (7), pp. 9-11; and Millspaugh (74), pp. 13, 18-20, and 25.

3.2.3.5 Psychic and Emotional Damages

If an individual who is displaced by the condemnation of his residence is forced to relocate at a considerable distance from that residence, he may suffer from the disruption of relationships which he has built up in his old neighborhood. Although most of these dislocation costs probably will be associated with the psychological stresses of moving away from family and friends, some direct financial hardship may arise from the disruption of business and credit relationships which have been established with local merchants. In addition, even if this individual succeeds in obtaining a new residence in his old neighborhood, the public project for which his previous residence has been condemned may so disrupt the neighborhood that it becomes a less convenient and less desirable area in which to live. Yet, once again, provision for the payment of compensation for these psychic costs does not exist in either traditional eminent domain law or supplementary legislation.**

3.2.3.6 Severance Damages

The condemnation of a portion of a parcel of land may adversely or beneficially affect the value of the portion of the parcel which has not been condemned. In principle, the measure of the amount of compensation which is paid to the owner of this parcel is the difference between the value of the parcel before the condemnation and the value of the uncondemned portion of the parcel after this appropriation. Thus, both the beneficial and adverse effects of the severance of a parcel of land are considered in the determination of the appropriate compensation for this severance. Yet, the courts generally have ruled that severance effects will influence the amount of compensation which is paid for the appropriation of a portion of a property only if these severance effects modify the market value of the uncondemned land rather than merely the market value of the business or activity which is operated on this land. Moreover, these severance effects must be clearly attributable to the new public facility and must specifically affect the uncondemned parcel of land.* Clearly, the principle of adjusting compensation payments to reflect severance effects is not always honored in practice.

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*Bosselman, Newsom, and Weaver (7), pp. 10 and 12.

**Ibid., pp. 10 and 12; and Klein (54), pp. 1-39.

An additional problem arises when an exercise of the power of eminent domain appropriates a portion of the property of an individual who owns two or more distinct parcels of land. Theoretically, if these two or more parcels exhibit a unity of use, severance effects should influence the payment of compensation to the owner of this property to the same extent that they would affect the payment of compensation for the appropriation of a portion of a single tract of land. However, in practice, the courts have not uniformly permitted the adjustment of compensation payments to reflect severance effects in situations of this type.**

3.2.3.7 Impairment of Access

Impairment of access frequently occurs either when a highway which abuts a commercial property is transformed into a limited access highway or when a highway of this type is left untouched while a new super-highway which diverts much of the traffic which previously has used the older road is constructed parallel to that road. In either instance, the owner of the commercial property is damaged by the reduction of traffic on the road which abuts his property. While this situation appears to be very similar to the situations in which severance damages have been permitted to influence compensation payments, the courts have tended in recent years to rule that an abutting property owner does not possess any property right which compels the state to maintain either a road or its traffic under threat of the payment of damages.***

3.2.3.8 Hazardous Uses

When a portion of a parcel of land has been condemned for the development of a hazardous public use, such as a gas transmission line, a high tension line, or a guided missile site, the prospective development of this use may induce fear or anxiety in the owner of the uncondemned property. Recent court decisions have established a trend of permitting the payment of severance damages in these situations if the proposed use clearly presents an immediate danger and if the development of this use is not uncertain or remote.* Thus, in certain restricted instances, compensation can be paid for psychic or emotional damages.

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*Edens (40), p. 317.

**Berger (5), pp. 93-95.

***Ibid., p. 96.

3.2.3.9 Interest on the Condemnation Award

Appreciable delays frequently occur between the date on which property is appropriated by an exercise of the right of eminent domain and the date on which compensation is paid for this appropriation. Consequently, the courts have ruled that it is proper to pay additional compensation for these delays in the receipt of the basic compensation payment. In particular, the courts have decided that property owners should be paid interest on this basic condemnation award throughout the term of the delay.

The basic problem which has confronted the courts in applying this decision is the determination of the appropriate interest rate to apply to the basic compensation payment to calculate the magnitude of the incremental compensation. In addition, the requirement that this incremental compensation must be paid has increased the total amount of compensation which is paid in some states to such a great extent that several state legislatures have enacted statutes which require condemning agencies to deposit a specified proportion of the expected basic compensation payment in a trust fund at the time of condemnation.**

3.2.3.10 Costs of Litigation

If a property owner decides to challenge an exercise of the right of eminent domain, he probably will incur substantial attorney fees. Moreover, in the absence of supplementary legislation, these litigation costs will not be considered in the court's determination of the amount of compensation which will be paid. At the present time, only a few states have enacted legislation which permits the reimbursement of attorney fees by condemning agencies. This granting of reimbursement of legal fees probably will motivate an increase in the challenging

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*Ibid., pp. 96-97.
**Ibid., pp. 92-93.

of condemnations of private property and may substantially increase the total cost to the states of acquiring property. However, these increased costs must be compared with the benefit which society obtains when it assures that those individuals who normally would not obtain legal counsel will receive condemnation awards which are consistent with just compensation.*

Clearly, this pattern of reasoning should be applied to any judicial decision to consider or ignore any particular element of damage to the property owner in the determination of just compensation. Specifically, the courts should compare the increase in economic efficiency which will be produced if a particular element of damage is included in judicial compensation decisions with the sum of the administrative costs which will be incurred if this element is included and the demoralization costs which will be borne by members of society if this item is excluded from consideration. Only if this comparison is favorable should the element of damage be systematically introduced into the court's decision-making process.**

Application of this criterion undoubtedly will result in the inclusion of several additional elements of damage in the determination of just compensation and, consequently, will increase the cost of exercising the right of eminent domain. However, since the traditional method of determining just compensation systematically grants awards which are less than the full opportunity cost of condemnation and, hence, encourages the development of public projects which are socially undesirable, this increase in the cost of condemnation will promote an improved allocation of real property between the public and private sectors.

Nevertheless, introduction of this criterion probably will not produce the inclusion of psychic or emotional costs into the determination of just compensation. Since these costs are subjective, they are essentially immeasurable. It is impossible to distinguish valid claims for substantial psychic costs from attempts to exploit the condemning agency. Thus, it inevitably will be necessary to continue to rely upon fair market value as the basic determinant of just compensation.***

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*Ibid., pp. 97-99.

**This analytical technique initially has been proposed in Michelman (73).

***Edens (40), pp. 321-322.

3.2.4 The Measurement of Just Compensation

The judicial standard for the determination of just compensation establishes as the appropriate amount of compensation for a property the price that will be voluntarily negotiated for this property by a hypothetical seller who is willing but not obligated to sell and a hypothetical buyer who is willing but not obligated to buy. However, since this price cannot be directly observed in any actual market, it has been necessary to develop acceptable techniques for the estimation of this price. Currently, there are three principal appraisal techniques which are employed to evaluate property in eminent domain proceedings. These techniques are the market data approach, the income capitalization approach, and the reproduction or replacement cost approach.

3.2.4.1 The Market Data Approach

If properties which are identical to the parcel of land which is being condemned have been exchanged in a free and open market, the prices which have been paid for these substitute properties should constitute reliable estimates of the value of the condemned property. Even if these other properties are merely comparable, but not identical, to the condemned parcel, their market prices should be valid indicators of the value of the condemned parcel to the degree that these properties are similar to the condemned property. Since the computation of an appraisal value for a property on the basis of comparable sales data obviously reflects the interaction of supply and demand, this technique is generally considered to be the most reliable approach to the estimation of the value of condemned properties. In fact, comparable sales data is accepted in most states as independent substantive evidence of the market value of condemned property. However, its usefulness in this manner is restricted to some extent by the inhibitions of the judicial rule concerning the admissability of hearsay evidence. Nevertheless, comparable sales data is accepted in all jurisdictions as a foundation for an expert's opinion of the value of a condemned property.

Before the price which has been paid for a particular property can be utilized in the estimation of the value of a property which has been condemned, it must be demonstrated that these parcels of land are similar. This demonstration of similarity must be predicated upon their geographic proximity to the same centers of economic activity and their uniformity in quality, size, and use. In addition, the comparable sale must have occurred within a reasonable period of time prior to the appropriation of the condemned property. Sales which are consummated subsequent to the date of condemnation are eliminated from consideration as comparable sales because the prices which are established in these sales may have been influenced by the condemnation itself. Finally, the comparable sale must have been a voluntary exchange in a free and open market. Consequently, the sale of a property to a potential condemning agency generally is inadmissable as a comparable sale because it may lack voluntariness and freedom from compulsion, although some states will accept a sale of this type as a comparable sale if a demonstration of its voluntariness can be provided.

The courts also refuse to recognize offers to sell or offers to buy as indicators of the value of a condemned property, presumably because of the ease with which evidence of this type can be fabricated. Similarly, appraisals of property value which are made for purposes other than condemnation are usually excluded from consideration in eminent domain actions. This judicial inflexibility may be inconsistent with the attainment of the best possible estimate of the value of a condemned property, particularly when valid comparable sales data is limited. Consequently, the accuracy of the measurement of just compensation might be improved in many instances if the courts would exhibit greater flexibility in admitting these types of information at least as evidence to support an expert's appraisal of the value of a condemned property.*

3.2.4.2 The Income Capitalization Approach

The theory of income capitalization is founded on the fundamental economic concept that the value of a productive asset is most appropriately measured on the basis of the amount of income that it generates. Consequently, the income capitalization approach estimates the value of a condemned property as the amount of wealth which, if it were invested at the same rate of return which would have been earned by this property if it had not been condemned, will yield for the property owner the same stream of income which would have been generated by his property if it had not been condemned. Clearly, the estimation of this amount of wealth requires predictions of both the future stream of income which the condemned property would have earned and the rate of return on the value of this property which this stream of income would have represented. In addition, since the business which occupies the condemned property usually can be relocated and, hence, generally is not appropriated by the condemning agency, the stream of income which must be forecast is not the total stream of income which is generated by this business on this property, but merely the portion of this total stream of income which constitutes the rental income of the property.

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*Massey (68), pp. 2-3; and Sengstock and McAuliffe (104), pp. 192-206 and 229.

This necessity of extensive forecasting and allocation of income causes the income capitalization approach to be the most complicated and the most conjectural method of estimating the value of a condemned property. Moreover, since the value which is estimated using this approach is extremely sensitive to the rate of return at which the stream of rental income is capitalized, this approach also is the most speculative appraisal technique. Consequently, the courts are very reluctant to accept the capitalization of income as the sole basis for the estimation of the value of a condemned property, although they frequently will admit evidence of this type as confirmation of appraisals which have been produced by other methods. Furthermore, the courts occasionally will accept the capitalization of income as the exclusive basis for the appraisal of the value of certain special purpose properties which are exchanged too infrequently to permit the obtaining of valid comparable sales data, such as large-scale rental property.*

3.2.4.3 Reproduction or Replacement Cost Approach

To determine reproduction costs, an estimate is obtained of the cost of building the condemned structure anew on the condemned property. The estimated physical and functional depreciation of the existing structure is then deducted from this estimated cost to produce an appraisal of the replacement cost of the existing use. Replacement cost evidence is admissible in the determination of the value of a condemned property if the existing structure is adjudged to be suitable for the property on which it is constructed. However, this evidence generally is not admissible if the structure is so inferior that it constitutes a detriment to the value of the property or if it is so expensive and elaborate that it is inappropriate for the property and its neighborhood.

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*Level (60); Massey (68), p. 3; and Sengstock and McAuliffe (104), pp. 206-222 and 229.

The replacement cost approach has been widely criticized on the grounds that it initiates its evaluation process with an estimated cost which may bear no relationship to the value of the property (in the sense that the property owner would not choose to construct a structure of this type if his property were vacant) and then adjusts this estimated cost by deducting from it an estimate of depreciation which usually must be calculated without sufficient factual data. Nevertheless, because of the absence of any other proof of value, the replacement cost approach is often employed to appraise the value of special purpose properties which are relatively unique and infrequently exchanged, such as churches or schools.*

3.2.4.4 The Objectivity of the Measurement Techniques

Although the established judicial standard for the determination of just compensation has been adopted by the courts in an attempt to assure objectivity in the appraisal of the value of condemned properties, the application of this standard to the estimation of the value of a particular property requires the exercising of substantial subjective judgment by the appraiser. Even when the appraiser employs the market data approach, judgment is required in the selection of properties which are considered to be comparable to the condemned property. Moreover, when comparable sales data are unavailable for a particular type of property, the utilization of the income capitalization approach or the replacement cost approach requires the exercising of considerably more discretion by the appraiser. Since each appraiser unavoidably introduces his own attitudes and prejudices into his estimation of the value of any property, it is not surprising that different appraisers frequently assign different estimated values to the same property.**

3.2.5 Procedural Considerations

3.2.5.1 Prior Negotiations

Condemning authorities normally attempt to avoid lengthy, expensive judicial condemnation proceedings by attempting to acquire desired property through direct voluntary negotiation. However, situations occasionally arise in which a condemning authority can function most efficiently if it resorts directly to the judicial process without making any attempt to negotiate a mutually agreeable purchase of the property. For example, a condemning authority might be suddenly confronted with a problem whose resolution can be performed effectively only if the authority can obtain the immediate acquisition of a particular parcel of land. Yet, several states have enacted legislation which requires the condemning authority to attempt to negotiate an amicable purchase of any property before it initiates condemnation proceedings. Inflexible compliance with this legislation may in some instances introduce substantial inefficiencies into the operations of that agency.*

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*Level (60); Massey (68), p. 3; and Sengstock and McAuliffe (104), pp. 222-230.

**Edens (40), p. 317.

3.2.5.2 The Right to Appeal Condemnation Awards

Several recent court decisions have addressed, but have not completely resolved, the issue of the effect that payment of a preliminary condemnation award should have on the right of either the condemning authority or the owner of the condemned property to appeal the magnitude of this award. If the condemning authority is prohibited from taking possession of a property unless it pays the preliminary condemnation award and if it surrenders its right to appeal the magnitude of this award either when it pays the award or when it acquires the property, the authority may incur substantial increases in project costs if it chooses to appeal the award. Specifically, the delay in the initiation of this agency's project which is generated when the condemning authority is denied immediate possession of the condemned property while it appeals the condemnation award will impose sizable opportunity costs upon the authority. In fact, in extreme circumstances, these costs may be sufficiently large to cause the cancellation of the project.

Similarly, if the owner of the condemned property surrenders his right of appeal when he accepts a preliminary condemnation award, any decision to appeal the magnitude of this award will deprive him of both the use of his property and the use of any provisional compensation for this property until the appeals procedure has been concluded. Conversely, if this property owner is permitted to acquire and spend a provisional compensation award while an appeal is being processed by the courts, it is conceivable that, when a final determination of the appropriate amount of compensation is achieved, this individual may have withdrawn and squandered an amount of income in excess of the final condemnation award and that the condemning authority will be unable to recover the difference between the property owner's actual withdrawals from the provisional award and the award which ultimately is authorized.

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*Berger (5), pp. 99-100.

Clearly, some reconciliation by the courts or the legislatures of these competing public and private interests in a manner which reasonably accounts for the unavoidable tradeoffs between these interests would be desirable.*

3.2.5.3 Private Input Into Condemning Authority Decisions

The existing administrative procedures which are employed by condemning authorities frequently do not adequately consider the interests of the individual owners of condemned property. Although these property owners generally have the right to appear at a public hearing which is conducted by the condemning authority, this right may be illusory to the extent that the full details of the authority's proposed project are not enunciated prior to this hearing and, hence, the property owners are not granted sufficient time to prepare cases to challenge the propriety of the project.

In addition, most state legislatures have not delineated either the scope of the courts' authority to review the decisions of condemning authorities or the procedures which the courts must follow in conducting a review of one of these decisions; although some jurisdictions have enacted administrative procedures acts which address the latter issue by specifying both the manner in which the condemning authority should make its determinations and the method by which the individual property owner can protest this decision. The universal adoption by state legislatures of both statutes of this type which adequately consider the rights of the owner of the condemned property and legislation which specifies the power of the courts to review the condemnation and compensation decisions of condemning authorities would greatly increase the predictability and equity of the condemnation process.**

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*Ibid., pp. 100-103.
**Ibid., pp. 103-104.

3.3 Conclusions

The preceding discussions of the operational problems associated with the implementation of such traditional land use control techniques as municipal zoning, subdivision regulation, building codes, and the exercise of the right of eminent domain clearly demonstrates that these mechanisms do not constitute, either individually or in combination, ideal methods for the regulation of private real property. Each of these techniques is restricted in its application and limited in its effectiveness by numerous administrative, economic, judicial, legal, and political problems.

However, this chapter has not demonstrated either that the unconstrained market could perform the allocation of activities to parcels of land more efficiently, that any alternative land use control mechanisms could regulate the use of real property more effectively, or that any modifications of these traditional techniques could cause them to function more satisfactorily. The resolution of these issues constitutes the primary objective of the remainder of this report.

4.0 ENVIRONMENTAL QUALITY AND THE OPTIMAL CONTROL OF MARKET FAILURE

If the assumptions which underlie the economic model of a perfectly competitive market were universally satisfied in all actual markets for goods and services, all impacts upon the natural environment which might be produced by activities performed in these markets would be appropriately taken into account in the decision making of each individual who participates in any of these markets. However, these assumptions are seldom, if ever, completely satisfied in any actual market. In fact, substantial deviations from full compliance with these assumptions are observed in many markets due to the existence of externalities, public goods, or increasing returns to scale in those markets.

This chapter both describes the problems which arise in the attainment of economic efficiency and the attainment of the most socially desirable allocation of resources when each of these types of market failure prevails in any particular market and identifies and evaluates the effectiveness of the various public policies which might be employed to resolve these problems in specific situations. Thus, Section 4.1 discusses the nature and the potential resolution of environmental problems attributable to externalities; Section 4.2 contains an analogous treatment of the environmental problems associated with public goods; and Section 4.3 develops a similar analysis of the environmental problems arising from increasing returns to scale. Finally, Section 4.4 presents some general conclusions concerning the manner in which the most socially desirable public policy for the control of any particular market failure can be selected for implementation.

4.1 Externalities

Externalities exist whenever the production or consumption opportunities of individual members of society are directly affected by resource allocation decisions of other society members -- decisions over which the externally affected individuals have no control. To be economically relevant, these external effects must not be attributable solely to the changes in the equilibrium set of market prices which occur as the economy responds to changes in supply and demand conditions. Indeed, these adjustments of equilibrium prices constitute the primary mechanism through which the market mechanism rations goods and services among alternative users and uses. Finally, the external effects must not result from the performance of malicious actions by the external decision makers. Rather, they must be produced only incidentally by these individuals as they pursue legitimate activities.

Externalities which satisfy these conditions can, and frequently do, prevent the market mechanism from attaining an economically efficient allocation of resources. Specifically, whenever those individuals whose actions generate relevant externalities fail to consider the implications of these external effects in their decision making, it is likely that the resource allocation which is achieved at equilibrium will not be Pareto optimal and, hence, that it will be theoretically possible to specify an infinite number of reallocations of resources which will increase the welfare of at least one member of society without decreasing the welfare of any other member of society. For example, if a firm, in conjunction with the production of its desired output, legally generates smoke which adversely affects the health and welfare of all individuals who reside in the neighborhood of the firm and if the firm fails to incorporate the external costs which it imposes upon its neighbors into its production (and smoke generation) decisions, the firm's equilibrium level of smoke generation generally will exceed the economically efficient level. When this situation prevails, economic efficiency will be enhanced if the firm reduces its generation of smoke to that level at which the cost which it will incur in performing any additional pollution abatement exceeds the gains which are obtained by its neighbors from that additional abatement and if the cost of the abatement which is performed is financed exclusively from the gains which are obtained by the firm's neighbors as a result of this reduction in smoke generation. This financing strategy guarantees that no member of society -- including the smoke generating firm -- will experience a lower level of welfare when smoke generation is curtailed than he obtains when no abatement is performed. Moreover, unless the cost which is incurred by the firm in performing the reduction in smoke generation is precisely equal to the total gains which are obtained by all of the firm's neighbors from this abatement, this financing strategy will not be unique. Rather, it will be possible to produce this increase in economic efficiency with an infinite number of alternative financing strategies which are differentiated only by the relative magnitudes of the net gains which are obtained by the various members of society.

Thus, as this example illustrates, when relevant externalities prevail it is generally possible to identify the direction in which the equilibrium allocation of resources will deviate from the economically efficient allocation of resources, to specify the manner in which resources should be reallocated to attain the economically efficient allocation, and to describe the method by which these modifications should be financed to promote Pareto optimality. However, the recognition and resolution of externality problems also requires both the identification of those market situations in which the externalities which arise can be expected to prevent the market mechanism from attaining economic efficiency and the isolation of techniques which can be employed to induce or require those individuals who are involved in these relevant externality situations to modify their behavior in a manner which is consistent with the attainment of economic efficiency. The resolution of these two issues is the objective of the remainder of this section.

4.1.1 The Possibility of Resolution by Negotiation

To appreciate the possibility of a negotiated resolution of an externality situation, it is necessary to recognize the reciprocal nature of any externality situation. This principle is described particularly well by Coase, who states:

> "The traditional approach has tended to obscure the nature of the choice that has to be made. The question is commonly thought of as one in which A inflicts harm on B and what has to be decided is: how should we restrain A? But this is wrong. We are dealing with a problem of a reciprocal nature. To avoid the harm to B would inflict harm on A. The real question that has to be decided is: should A be allowed to harm B or should B be allowed to harm A? The problem is to avoid the more serious harm."*

The validity of this principle can be demonstrated easily within the context of the preceding smoke generation example, where it is observed that the unrestricted generation of smoke by the firm both permits the earning of additional profits by the firm and imposes external costs upon the firm's neighbors, while restriction of the firm's generation of smoke both provides gains to the firm's neighbors and imposes smoke control costs upon the firm. Thus, it can be concluded that, in any externality situation, the external effect is caused by both the resource owner who generates the effect and the resource owner who receives it. Consequently, if the optimal allocation of resources is to be attained, it is desirable that both of these resource owners should take account of the external effect in making their resource allocation decisions. In principle, this objective can be attained if an individual who desires to modify the behavior of another individual who is generating an externality engages in trade with that other individual which moves both of them to preferred positions where no additional mutually agreeable trades are available and, hence, Pareto optimal equilibrium prevails.

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*Coase (19), pp. 1-2.

However, before exchange can occur, it is necessary to establish an assignment of property rights in the externality situation. Thus, in the smoke generation example, it must be established either that the firm possesses the right to generate any quantity of smoke which it determines to be desirable (as has been implicitly assumed in the example) or that the firm's neighbors possess the right to an environment which contains at most a specified quantity of smoke (possibly zero). Yet, after an assignment of property rights has been clearly specified, it can be demonstrated that, if these property rights are transferable* and rigidly enforced and if there are no costs associated with the negotiation and enforcement of transactions, any particular assignment of property rights will produce an economically efficient allocation of resources. Specifically, when these conditions are satisfied, the stipulated assignment of property rights will provide an incentive to one of the two parties who are involved in the externality situation to attempt to change the extent to which external effects are generated by offering inducements to the other party to modify his behavior. Thus, at the extremes, if the resource owner who produces an external effect (e.g., the smoke generating firm) is declared to be completely liable for the damages caused by this external effect, he will be motivated to pay an indemnity to the resource owner who receives the external effect (e.g., the firm's neighbors) to secure that resource owner's acquiescence to the production of additional output; while, conversely, if the resource owner who produces an external effect is declared to have no liability for the damages caused by this external effect, the resource owner who receives the external effect will be motivated to pay a bribe to the externality-producing resource owner to induce that resource owner to reduce his production. In either case, whenever the resource owner who produces the external effect decides to increase his production, he incurs a cost in the form of either an increased indemnity payment to or a foregone bribe payment from the resource owner who receives the effect. Similarly, whenever the resource owner who receives the external effect decides to decrease the extent to which he absorbs this effect, he incurs a cost in the form of either a foregone indemnity payment from or an increased bribe payment to the resource owner who produces the effect. Consequently, whenever either of these parties makes his resource allocation decisions, he appropriately incorporates the full social cost of his activities into his decision-making process. The inevitable result of this procedure is the attainment of an economically efficient allocation of resources.

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*Property rights with respect to liability for damages are transferable if the government enforces liability rules only upon appeal by one of the parties who are involved in the externality situation. This enforcement policy introduces the possibility of exchange between these parties.

It can also be demonstrated that, since the marginal cost associated with any particular increase in the production of an external effect is unaffected by the assignment of different systems of property rights, the same economically efficient allocation of resources will be attained regardless of the particular system of property rights which is adopted, so long as the differences in the distributions of wealth which are associated with the various systems of property rights have no effect upon demand patterns. Thus, in summary, this analysis asserts that if the income elasticity of demand is zero in all markets (including the market for the external effect) and if the costs of negotiating and enforcing transactions are zero, the market resolution of any externality problem will be both economically efficient and allocatively neutral with respect to the assignment of property rights.*

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*See Coase (19) for a more thorough derivation and analysis of these assertions.

However, several researchers have conclusively demonstrated that the asserted allocative neutrality of alternative assignments of property rights will not prevail when some of the resource owners who are involved in the externality situation are merely consumers,* when the income elasticity of demand for at least some goods in the economy is not zero,** or when the costs of negotiating and enforcing transactions are positive.*** Since one or more of these conditions are extremely likely to exist in any realistic externality situation, it is obviously unreasonable to expect that negotiated resolutions of externality situations will be allocatively neutral with respect to alternative assignments of property rights.

Yet, even under these conditions, each alternative assignment of property rights will generate an economically efficient allocation of resources relative to that assignment of property rights. However, different assignments of property rights usually will generate different economically efficient allocations of resources. More specifically, in any particular externality situation, the production of the externality will be greater if the resource owner who produces the external effect is declared to have no liability for the damages attributable to this external effect than if this individual is declared to be completely liable for these damages. Consequently, in any realistic externality situation, the adoption of a particular assignment of property rights may be virtually equivalent to selecting a particular economically efficient allocation of resources at equilibrium.

Moreover, since positive transactions costs inhibit exchange, the disparity between the allocations of resources which prevail at equilibrium under different assignments of property rights in any externality situation will increase as transactions costs increase. In particular, as the externality situation becomes more complex and as the number of resource owners who are involved in this situation increases, transactions costs can be expected to increase and, hence, deviations from allocative neutrality are likely to expand. In fact, it is conceivable that in some externality situations transactions costs may be so high that movements away from the initial allocation of resources which is specified by the prevailing system of property rights may be impossible.

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*Dolbear (39), pp. 95-97 and p. 102 and Mishan (77), pp. 61-66 and pp. 83-84.

**Samuels (97), pp. 6-12 and Weld (114), p. 609.

***Randall (88), pp. 43-44 and Samuels (97), pp. 19-20. For a more detailed discussion of all of these qualifications of the assertion of allocative neutrality, see Sections 2.1.6 and 2.1.9 of this report.

Recognizing this possibility, Demsetz* has asserted that the absence of an observable market for an externality may constitute an economically efficient outcome since, when this situation exists, the transactions costs which must be incurred to establish a market for this externality must exceed the benefits which will be obtained by society if this market is established. While this assertion is unambiguously true whenever the same level of transactions costs must be incurred for all of the alternative assignments of property rights which might be adopted in this externality situation, its validity is uncertain if different level of transactions costs are associated with different assignments of property rights.

Thus, as several researchers** have stated and at least one researcher*** has demonstrated empirically, it is fallacious to conclude from an observation that no agreement has been negotiated for the internalization of a particular externality that no agreement can be negotiated for the internalization of this externality. It is frequently possible that the adoption of a different assignment of property rights may permit the negotiation of an agreement for the internalization of the externality which has been unattainable under the initial assignment of property rights. For example, in an externality situation in which a single firm is generating smoke which adversely affects a large number of neighboring property owners, a realignment of property rights from a system in which the smoke generating firm is not liable for the damages which are attributable to his activities to a system in which he is fully liable for these damages is likely to promote the negotiated internalization of some externalities which would not have been internalized under the initial assignment of property rights. Under the initial assignment of property rights, any of the neighboring property owners will receive the same benefit from any reduction in the generation of smoke regardless of the magnitude of his contribution toward defraying the cost of providing this reduction in smoke generation.

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*Demsetz (35), pp. 13-14.

**McKean (70), pp. 625-626; Mishan (77), pp. 70-75; Randall (88), pp. 45-46; and Samuels (97), pp. 21-23.

***Crocker (23).

The net result of the adoption of this individually rational behavior pattern by all of the neighboring property owners obviously will be the provision of an inefficiently low level of smoke abatement. Conversely, under the alternative assignment of property rights, the firm will not confront any equivalent incentive to understate his willingness to pay the neighboring property owners for the opportunity to emit smoke. Hence, the negotiated internalization of the costs attributable to the external effects associated with smoke generation will be greater under this system of property rights unless each individual neighboring property owner, or a relatively small coalition of these property owners, is permitted to exercise effective veto power over the firm's generation of any quantity of smoke.

Yet, despite the obvious differences in the extent to which negotiation may permit the internalization of externalities under different assignments of property rights, it remains true that the allocation of resources which prevails at equilibrium under each assignment of property rights constitutes an economically efficient allocation of resources relative to that assignment of property rights. However, not all of these efficient allocations of resources will constitute a maximization of net social products. Thus, if the maximization of net social product is desired, society must make a choice among different economically efficient allocations of resources.

Nevertheless, if individual preferences are weighted positively in the determination of the level of net social welfare which is associated with any particular allocation of resources, there appears to be substantial justification in any externality situation to adopt an assignment of property rights which provides to the individuals who are involved in this externality situation an ample opportunity to express these preferences. Moreover, since the observed purchasing behavior of an individual in a market situation is generally acknowledged to be the most reliable available indicator of the economic preferences of that individual, it appears desirable in externality situations to adopt assignments of property rights which will maximize the opportunities of the individuals who are involved in those situations to engage in market exchange which will promote the internalization of the externality. Thus, in the absence of overriding social considerations, it appears desirable to rely upon the negotiated resolution of externality problems in any situation in which voluntary negotiation of the permissible level of the externality is feasible. In particular, voluntary negotiation undoubtedly can be relied upon to generate the highest attainable level of net social product in those externality situations in which one property owner's use of a particular portion of his property for the storage of compost produces objectionable odors on his neighbor's property or a situation in which one property owner's use of a power mower during particular hours of the day severely disturbs the sleep of residents of adjacent properties.

4.1.2 The Appropriate Nature and Role of Public Policy

As the number of individuals who are affected by any particular externality problem increases, the transaction costs associated with the attainment of a negotiated resolution of this problem also increases and, hence, the economic and social desirability of relying upon voluntary negotiation for the resolution of this problem decreases. In particular, in any situation in which it is discovered that some type of non-market mechanism may involve a lower level of transactions costs than is attainable through a negotiated internalization of the externality under any assignment of property rights, it is conceivable that the maximization of net social product may require the introduction of some form of governmental intervention.* Specifically, when the number of individuals who are affected by a particular externality problem becomes so large that the internalization of the externality assumes the nature of a public good for all of these individuals, the economic and social desirability of governmental intervention is virtually assured. This situation undoubtedly pertains to the vast majority to the air and water pollution phenomena which are generally acknowledged to be social problems.

4.1.2.1 Unilateral Taxes and Subsidies

The traditional economic resolution of these large-scale externality problems has its origins in the writings of Pigou,** who asserts that an economically efficient allocation of resources is attained by a society when its national dividend is maximized. Moreover, the national dividend will be maximized when the private marginal net product is equal to the social marginal net product in all uses. Thus, inefficiency exists in every activity in which this equality is not satisfied. To eliminate this inefficiency, Pigou proposes the provision of incentives which will induce those firms which are generating externalities to produce those levels of output which will maximize the national dividend.

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*Demsetz (34), p. 34, and Randall (88), pp. 45-46, concur in this conclusion.

**Pigou (85).

More specifically, Pigou recommends the development of a system of taxes and subsidies which will modify the cost function of an externality-producing firm in a manner which will cause the firm's profit-maximizing output level to correspond to the socially optimal output level. This recommendation generally has been interpreted as a proposal that the price of the output of the firm should be modified to reflect more accurately the social marginal net product through the imposition of specific (per unit) excise taxes and subsidies upon this output. Thus, if the firm is generating an external diseconomy, a specific excise tax should be imposed to induce a reduction in output; while, if the firm is creating an external economy, a specific excise subsidy should be provided to motivate an increase in production.

However, Plott* has demonstrated that, unless the desired output of the firm and the externality are produced in fixed proportions, this procedure is fundamentally incorrect. Instead, the corrective tax or subsidy must be imposed either on the particular output which constitutes the externality (e.g., smoke, noise level, water-borne effluent) or, under certain conditions, on the resource input from which the externality is generated. Moreover, if the corrective tax or subsidy is imposed on the specific output which constitutes the externality, it should be set at a level equal to the sum of the values of the incremental external effects which are incurred by all of the individuals who are involved in the externality situation at the economically efficient rate of production of that output. This requirement is expressed somewhat more succinctly in the following equation:

$$T = \sum_{i=1}^{n} ME_i$$

where T = the optimal tax or subsidy per unit of the externality produced,

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*Plott (86).

ME_i = the marginal evaluation of the economically efficient rate of production of the output which constitutes the externality by the $i^{\underline{th}}$ individual who is involved in the externality situation, and

n = the total number of individuals who are affected by the externality problem.

Observe that if the externality is an external economy for the $i^{\underline{th}}$ individual, ME_i will be positive; while if the externality is an external diseconomy for the $i^{\underline{th}}$ individual, ME_i will be negative. Thus, if $\sum_{i=1}^{n} ME_i$ is positive, the externality constitutes an external economy for the society, while if this summation is negative, the externality constitutes an external diseconomy for the society.

To promote economic efficiency in the generation of an external economy, the government should either pay to the firm which generates this externality a specific subsidy equal to T for each unit of the externality which it produces or impose upon this firm a tax equal to T for each unit by which its production of the externality falls short of the economically efficient production rate of this externality. Similarly, to promote economic efficiency in the generation of an external diseconomy, the government should either impose upon the firm which generates this externality a tax equal to (-T) for each unit of the externality which it produces or pay to this firm a subsidy equal to (-T) for each unit by which its production of the externality falls short of the rate of production of the externality which the firm would select in the absence of any governmental intervention. Since, if the firm desires to maximize profits, it will choose to produce any unit of the externality for which the total revenue from production (including subsidies) exceeds the total cost of production (including taxes) and will refrain from producing any unit of the externality for which the total cost of production (including taxes) exceeds the total revenue from production (including subsidies), these taxation and subsidization policies will, in general, induce the firm to adjust its rate of production to the economically efficient rate.*

However, numerous researchers** have challenged the assertion that both taxes and subsidies constitute equally effective mechanisms for the internalization of either external economies or external diseconomies. In any externality situation the determination of the appropriate total magnitude of a tax or a subsidy requires the comparison of the actual level at which an externality is produced to a specified base level of production of that externality. The development of either an economically efficient taxation mechanism for the internalization of an external diseconomy or an economically efficient subsidy mechanism for the internalization of an external economy is not difficult since no production of the externality constitutes an effective specified base level for either of these mechanisms. However, the development of an economically efficient subsidy mechanism for the internalization of an external diseconomy or an economically efficient taxation mechanism for the internalization of an external economy is likely to be substantially more difficult. In particular, the specified base level of externality production for a subsidy mechanism for the internalization of an external diseconomy must be at least as great as the level which the producer of the external diseconomy would choose to produce in the absence of any internalization of the externality; while the specified base level of externality production for a taxation mechanism for the internalization of an external economy must be precisely equal to the level which would be produced if the externality were completely internalized. To guarantee that these conditions will be satisfied, the administrative authorities which are responsible for the implementation of these mechanisms must have complete knowledge of the cost constraints and revenue opportunities which confront the producers of the externalities. While it is conceivable that acceptable specified base levels for these mechanisms might be determined initially, it is unlikely that these base levels will be maintained at effective levels as the market conditions facing the externality producers change over time. If, at any time, the cost and revenue conditions confronting the producer of an external diseconomy cause his profit-maximizing production level of this externality to exceed the specified base level, the subsidy mechanism will cease to be effective in inducing the internalization of the external diseconomy. Similarly, if the profit opportunities confronting the producer of an external economy cause his profit-maximizing production level of this externality to deviate in either direction from the specified base level, the taxation mechanism will cease to generate an economically efficient allocation of resources. Once again, to assure that the specified base levels will be adjusted appropriately to avoid these outcomes, it is required that the administrative authorities must have complete knowledge of the profit opportunities of the externality producer. Since the likelihood that these conditions will be satisfied in any realistic situations is extremely low, it is very unlikely that both taxation and subsidization will be equally effective mechanisms to induce the internalization of either external economies or external diseconomies. Rather, it is virtually certain that taxation will be more effective than subsidization in inducing the internalization of external diseconomies; while subsidization will be more effective than taxation in inducing the internalization of external economies.

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*Goetz and Buchanan (47) and Schall (103) have demonstrated that these standard taxation and subsidization policies generally will not produce an economically efficient allocation of resources in externality situations which incorporate reciprocal externalities among different firms in a single perfectly competitive industry. Similarly, Dolbear (39) has proven that these standard policies generally will not promote economic efficiency in externality situations in which the producer of the externality is a utility maximizing consumer. However, as Hay and McGowan (50) and Dolbear have domonstrated, in both of these cases the deficiencies of the standard policies can be remedied by introducing either a lump sum subsidy or a lump sum tax in addition to the standard specific tax or subsidy.

**See Dolbear (39), pp. 100-101 and p. 103; Kamien, Schwartz, and Dolbear (53); Mumey (79); and Tybout (110), pp. 261-262.

4.1.2.2 The Desirability of Bi-Lateral Taxes and Subsidies

Although unilateral taxation is generally conceded to be superior to unilateral subsidization for the resolution of external diseconomy problems and unilateral subsidization is generally conceded to be superior to unilateral taxation for the resolution of external economy problems, several researchers* contend that neither of these policies is capable of inducing the complete internalization of externalities because each fails to consider the reciprocal nature of any externality situation. In particular, Buchanan and Stubblebine contend:

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*Buchanan (13), Buchanan and Stubblebine (15), Furubotn and Pejovich (43), and Turvey (109).

> "The important implication to be drawn is that full Pareto equilibrium can never be attained via the imposition of unilaterally imposed taxes and subsidies until all marginal externalities are eliminated. If a tax-subsidy method, rather than "trade" is to be introduced, it should involve bi-lateral taxes (subsidies). Not only must B's behavior be modified so as to insure that he will take the costs externally imposed on A into account, but A's behavior must be modified so as to insure that he will take the costs "internally" imposed on B into account. In such a double tax-subsidy scheme, the necessary Pareto conditions would be readily satisfied."*

For example, if a community adopts a unilateral taxation mechanism for the control of air pollution under which the individuals who are adversely affected by this externality are not paid compensation for the pollution which they absorb at equilibrium, these individuals will fail to recognize the full social cost associated with the imposition of more stringent restrictions upon the generation of air pollution and, hence, will be motivated to seek the adoption of these additional, inefficient restrictions. Consequently, it has been recommended that, to preclude this possibility, all of the parties who are involved in this externality situation should be compelled to recognize the full social cost of their actions through the imposition of a bi-lateral system of taxes and subsidies upon both the emitters and the recipients of the air pollution.

The implementation of this recommendation clearly is substantially more difficult than the implementation of a unilateral tax or subsidy. As explained by Regan:

> "The reciprocal nature of most externalities means that Pigou considerably underestimated the difficulty of finding regulatory (tax-subsidy) schemes which would

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*Buchanan and Stubblebine (15), p. 383.

> guarantee internalization...In general to set up an appropriate tax-subsidy scheme might require as much information on the part of the regulating agency as would be required for centralized decision-making. The market-mechanism-plus-regulation, then, is no certain high road to efficiency.*

However, as Baumol** demonstrates, in those situations in which there are a large number of recipients of an externality (e.g., most air or water pollution situations and many noise pollution situations), the introduction of an internalization mechanism under which these recipients are paid compensation for the external effects which they absorb may be unnecessary. In these situations, the external effect constitutes a public externality and the control of the external effect constitutes a public good. Thus, Baumol asserts:

> "As with all public goods, an increase in one user's consumption does not reduce the available supply to others. Hence, the appropriate price (compensation) to a user of a public good (victim of a public externality) is zero except, of course, for lump sum payments. Thus, perhaps, rather than saying there is no price that will yield an optimal quantity of a public good (externality), it may be more illuminating to say that a double price is required: a nonzero price (tax) to the supplier of the good, and a zero price to the consumer. Of course, no ordinary price can do this job, but a Pigouvian tax, without compensation to those affected by an externality, can indeed do the trick."***

Yet, even this assertion requires qualification. In particular, Mohring and Boyd**** show that, even when there are a large number of recipients of an externality, a unilateral tax or subsidy will unambiguously produce an economically efficient allocation of resources only if the control of the externality constitutes a pure public good for each recipient of this externality (i.e., only if the quantity and quality of any modification of the production of the external effect which is obtained by each recipient of this effect is completely unaffected by any action which can be taken by this individual). However, if a recipient of the externality can affect the extent to which he benefits from the control of the externality by changing his location, his scale of operation, or any other decision, the attainment of economic efficiency requires that this recipient must be compelled to recognize the impact that his initiation of any of these actions will have upon the socially optimal activity levels of the producers of the externality. In many instances, compelling this recognition may require the imposition of bi-lateral taxes and subsidies.

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*Regan (90), pp. 436-437.

**Baumol (4), pp. 309-312.

***Baumol (4), p. 312.

****Mohring and Boyd (78), pp. 352-356.

For example, if the control of air pollution through the imposition of an unilateral tax upon the emitters of air pollution induces additional individuals to locate in the neighborhood of these emitters, the execution of these locational decisions will increase the marginal damages which are attributable to the prevailing level of air pollution. If the unilateral tax has initially been set at a rate equal to the value of the pollution which will prevail when the socially optimal allocation of resources has been attained, these locational adjustments merely will constitute the mechanism through which the initial economically efficient allocation of resources will be transformed into the socially optimal resource allocation at equilibrium. Excessive locational adjustment will not occur because the unilateral tax will induce the emitters of air pollution to generate the socially optimal level of pollution; while the existence of this level of air pollution will discourage the location of an inefficiently large number of recipients of air pollution in the neighborhood of these emitters.

However, if the unilateral tax has initially been set at a rate equal to the value of the marginal damages which are attributable to the prevailing level of air pollution, the induced movement of additional individuals into the neighborhood of the emitters of air pollution will cause the value of the marginal damages which are attributable to this pollution to exceed the established tax rate and, hence, will cause the economically efficient levels at which these emitters should generate air pollution to become less than the prevailing levels at which they presently are generating pollution. To rectify this deviation from economic efficiency within the context of a unilateral taxation mechanism, the unilateral tax must be increased to a rate equal to the increased value of the marginal damages which are attributable to the prevailing level of air pollution. Moreover, this process of adjusting the unilateral tax rate must be repeated until a particular adjustment of the tax rate which induces no movement of additional individuals into the neighborhood of the emitters of the pollution is introduced. When this condition is achieved, the prevailing unilateral tax rate will be precisely equal to the value of the marginal damages which are attributable to the prevailing level of air pollution and, consequently, the socially optimal allocation of resources will have been attained. *

Yet, unless the implementation of this adjustment process is perfectly costless, it may be more economically and administratively efficient to induce the recipients of the air pollution to take the consequences of their locational decision into account more directly, possibly by imposing upon each of these recipients a site or franchise tax equal to the decrease in the net social product of emitters of air pollution which will result if that individual carries out his location decision. Thus, a bi-lateral taxation or subsidization mechanism may be required for the attainment of economic efficiency whenever the control of an externality does not constitute a pure public good for all recipients of this external effect. **

Finally, Marchand and Russell*** demonstrate that if the cost functions of the recipients of an external diseconomy are non-separable (i.e., if the magnitude of the external cost attributable to the external diseconomy is affected by the output decisions of the recipients of the externality)****, neither a bi-lateral subsidization mechanism nor a bi-lateral taxation mechanism will generate the optimal allocation of resources which evolves when both the producers and the recipients of the external diseconomy cooperate in the maximization of their joint profits. Rather, the adoption of a subsidization mechanism will result in the production of an inefficiently high level of output by the producers of the external diseconomy and an inefficiently low level of production by the recipients of the externality; while the introduction of a taxation mechanism will induce the production of an inefficiently low level of output by the producers of the external diseconomy and an inefficiently high level of production by the recipients of the externality. Yet, in this same situation, an appropriate unilateral taxation or subsidization mechanism can induce an internalization of the external diseconomy which will produce the optimal allocation of resources. Moreover, an appropriate unilateral taxation mechanism can also generate an economically efficient allocation of resources when the cost functions of the recipients of the external diseconomy are separable (i.e., if the magnitude of the external cost which is imposed upon each recipient by the external diseconomy is independent of the level of output which is produced by that recipient).

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*Baumol (4), pp. 314-315.

**Mohring and Boyd (78), pp. 354-356.

***Marchand and Russell (66).

****Formally, a cost function $C(q_1, q_2)$ is non-separable if it cannot be expressed in the form $C(q_1, q_2) = C^1(q_1) + C^2(q_2)$.

Consequently, it must be concluded that neither the imposition of unilateral taxes or subsidies nor the imposition of bilateral taxes and/or subsidies constitutes a universally effective technique for the internalization of externalities. Rather, in each externality situation, the appropriate internalization mechanism must be determined on the basis of, at least, such considerations as the cost conditions confronting each recipient of the externality, the number of recipients who are involved in the situation, and the extent to which the control of the externality constitutes a pure public good for each of these recipients.

4.1.2.3 The Problem of Multiple Local Optima

Baumol* demonstrates that the presence of sufficiently strong external diseconomies will modify the production and consumption opportunities of society so extensively that any particular taxation mechanism (e.g., unilateral taxation of emitters of air pollution, bilateral taxation of both emitters and recipients of air pollution, etc.) can attain equilibrium at any one of several different economically efficient allocations of resources. However, only one of these allocations of resources will constitute the socially most desirable allocation which can be produced by that taxation mechanism. Moreover, the determination of this socially most desirable allocation of resources requires not only the identification of those allocations of resources for which the first and second order conditions for the maximization of social welfare are satisfied, but also the determination of the particular element of this set of potentially optimal allocations which actually provides the highest attainable level of social welfare. Consequently, the specification of the socially most desirable allocation of resources requires detailed knowledge of both the incremental social costs and benefits which are attributable to any particular change in the rate of production of an external diseconomy and the total social costs and benefits which are associated with any particular rate of production of this externality. In general, it is impracticable to obtain this detailed knowledge. Thus, although it is conceptually possible to structure virtually any taxation mechanism in a manner which will induce the attainment of any desired allocation of resources at equilibrium, information limitations generally preclude the *a priori* specification of the precise structure of any particular taxation mechanism which will induce the attainment of the socially most desirable allocation of resources. Moreover, the existence of several locally optimal allocations of resources clearly implies that it is inappropriate to rely upon iterative procedures which systematically adjust the structure of this taxation mechanism to achieve this objective, since it is impossible to guarantee that any adjustment process will produce convergence to the socially most desirable allocation of resources rather than to some locally optimal resource allocation.

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*Baumol (4), pp. 313-320.

In this situation, Baumol recommends that society should specify a set of minimum standards of acceptability and, subsequently, seek to develop a taxation and subsidy mechanism which is capable of attaining these specified standards. Although the application of this recommendation obviously will not normally produce the socially most desirable allocation of resources, it does have the virtue of guaranteeing the provision of some socially acceptable allocation of resources and, hence, of achieving an improvement in the allocation of resources relative to that allocation which would have prevailed in the absence of governmental intervention. For example, this recommendation might be particularly applicable to the control of water pollution in a region through which several rivers and streams flow. While the specification of a comprehensive taxation mechanism which would induce the socially optimal utilization of each of these water courses undoubtedly would be impracticable, the establishment of a taxation system which achieves a satisfactory level of water quality in each river and stream would be administratively feasible and, probably, socially and economically desirable.

This general approach to the resolution of externality problems is also advocated by Dales*, who asserts that the stringent information requirements of those taxation and subsidization mechanisms which provide for the complete internalization of externalities render these mechanisms impossible to implement. Consequently, he concludes that the best available strategy for the control of an externality consists of the specification of a set of minimum standards of acceptability in the production of this externality, the creation of that quantity of rights to produce this externality which is consistent with these standards, and the establishment of a market in which these rights can be exchanged.

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*Dales (25).

Obviously, the prices which are established for these rights in this market are functionally equivalent to Baumol's taxes and subsidies as incentives for the attainment of the specified standards. Thus, the relative desirability of adopting Dale's exchange strategy rather than Baumol's taxation and subsidization strategy in any particular externality situation can be determined primarily on the basis of a comparison of the feasibility and cost of defining, policing, exchanging, and enforcing rights to produce the external diseconomy with the feasibility and cost of establishing, administering, and enforcing taxes or subsidies applied to this production.

4.1.2.4 Information Requirements

Even in those externality situations in which external diseconomies are not sufficiently strong to cause the existence of several locally optimal allocations of resources within the feasible set of production and consumption opportunities of a society, it is possible that taxation and subsidization mechanisms will constitute unsatisfactory instruments to induce the attainment of the socially most desirable resource allocation. In particular, Davis and Whinston* demonstrate that the implementation of a taxation or subsidization mechanism for the internalization of an externality may impose upon the administrator of this mechanism information requirements which are so demanding as to preclude the adoption of the mechanism. Specifically, they prove that the volume of information which must be collected and analyzed to implement a taxation or subsidization mechanism may be sufficient to permit the administrator of the mechanism to determine directly the optimal resource utilization decision for each of the resource owners who is involved in the externality situation. When this condition arises, the direct specification of the optimal allocation of resources (i.e., the direct governmental regulation of the externality situation) will be at least as tractable as the calculation of the appropriate tax and subsidy schedules.* Moreover, this potential dominance of regulation over taxation and subsidization in the internalization of externalities is likely to prevail even in externality situations in which it is possible to apply an iterative procedure which circumvents most of these information collection and analysis requirements for the determination of appropriate taxes and subsidies,** since the implementation and operation of a procedure of this type is not costless.

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*Davis and Whinston (31) and Davis and Whinston (32).

Yet, it is also conceivable that, in some instances, both direct governmental regulation and the implementation of taxation and subsidization mechanisms will be less effective than some other internalization mechanism in promoting the attainment of the socially optimal allocation of resources. In particular, Davis and Whinston assert that in many externality situations the optimal public policy might be to permit the merger of the resource owners who are involved in the situation until those external effects which can be internalized have been eliminated and, hence, the "natural unit" for decision-making has been achieved.*** Thus, clearly, the substantial differences in the cost of obtaining relevant information in different externality situations render it impossible to assert that the adoption of any particular internalization mechanism will unambiguously be socially most desirable in all externality situations.

4.1.2.5 Uncertainty

If the development of an internalization mechanism which is capable of inducing the attainment of the socially optimal allocation of resources is to be even theoretically possible, it is necessary that the administrator of this mechanism must be able to identify the production opportunities of the society with certainty. However, many of the characteristics of the environment which influence most significantly the specification of the appropriate structure of any internalization mechanism which attempts to achieve this resource allocation are inherently stochastic in nature. Rainfall and, hence, stream flows exhibit both seasonal and annual variability. Similarly, the incidence of atmospheric inversions varies over time.* Consequently, any internalization mechanism which strives to exert optimal control over the production of an externality which embodies stochastic characteristics must be dynamically responsive to these stochastic environmental conditions. Thus, for example, if a taxation mechanism is to achieve the socially optimal generation of air pollution, the rate at which this tax is imposed upon the emitters of pollution must be increased as the marginal damages which are attributable to air pollution increase when an atmospheric inversion occurs; while if this same objective is to be attained through the application of performance standards to the generation of air pollution by these emitters, the restrictiveness of these standards must be increased in the event of an atmospheric inversion.

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*This conclusion can be asserted with greater conviction if the cost functions of the resource owners who are involved in the externality situation are non-separable than if these cost functions are separable. See Davis and Whinston (31).

**An iterative procedure which can perform this function in at least some externality situations is described in Davis and Whinston (32), pp. 312-216.

***Davis and Whinston (31), p. 256 and p. 261.

Obviously, the successful implementation of any dynamically responsive internalization mechanism requires both accurate predictions of those stochastic conditions which influence the optimal structure of this mechanism and perfect knowledge of the effect of these stochastic environmental conditions upon the value of the marginal damages which are attributable to the externality whose control is sought. Unfortunately, these requirements commonly fail to be fulfilled in those externality situations which are generally considered to constitute valid areas of governmental intervention. The general inability of physical scientists to forecast accurately future environmental conditions is well documented. In addition, their knowledge of the manner in which biological and chemical processes translate changes in basic environmental conditions into impacts which affect the production and consumption opportunities of society is surprisingly limited. Finally, the ability of social scientists to evaluate the value of the marginal damages which are incurred by society as a result of these impacts is severely circumscribed, both theoretically and in practice.**

The implications of these uncertainties for the development of internalization mechanisms is intensified by the realization that environmental systems can be imperfectly reversible. Toxic substances which have been introduced into the environment may deteriorate extremely slowly and may be removable only imperfectly and at great cost. Reclamation of stripmined land is, at best, partial and, frequently, extremely expensive. The existence of limitations upon the reversibility of natural systems reduces the social desirability of utilizing any iterative technique to determine the optimal structure of any internalization mechanism, since it may be impossible to correct fully any inappropriate adjustment which is generated by that technique. Conversely, it enhances the desirability of developing internalization mechanisms which are "...designed to preserve options and avoid risks."* Therefore, in those externality situations in which either the probability that an irreversible impact will be generated is high or the anticipated consequences of any irreversible impacts which might be generated are especially adverse, it might be socially desirable to attempt to internalize these externalities through the initiation of either the direct governmental regulation of those activities which contribute to the creation of the potentially irreversible impacts or the imposition upon these activities of standards which specify the maximum allowable rate at which they may generate these externalities.

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*Roberts (93), p. 14 and p. 21.

**Roberts (93), pp. 20-28.

Yet, if either of these internalization mechanisms is adopted in any particular situation, it is important to recognize that compliance with its stipulations by those activities which are involved in the situation will not be automatic. Consequently, to induce compliance with the regulations or standards, some penalty must be imposed upon any activity which fails to comply with their stipulations. In general, the magnitude of this penalty should be relatively larger for the production of impacts for which the probability of irreversibility is relatively higher or the anticipated consequences of irreversible impacts are relatively more adverse. Moreover, since, for any reasonable penalty of a constant amount, there will exist instances in which some activities will rationally choose to violate these stipulations, it usually will be desirable to attempt to restrict the extent to which the actual generation of adverse effects exceeds the administratively specified levels by imposing upon those activities which violate any regulations or standards a positive marginal penalty for each unit by which the regulation or standard is violated. Similarly, since normal regulation and standards provide no incentives for activities to generate adverse external effects at rates which are lower than the rates which are specified in these regulations or standards, it might be socially desirable in many instances to attempt to induce the adoption of this behavior pattern by imposing a tax of a specified amount for each unit of the external effect which is produced up to the stipulated level (or by providing a subsidy of a specified amount for each unit of the external effect which is not produced relative to the stipulated level) in addition to any penalty which is imposed for violation of the regulation or standard. Thus, in summary, in externality situations which may involve the production of irreversible impacts, the best available internalization mechanism may consist of a positive marginal tax or subsidy applied to each unit of the externality which is produced up to a stipulated level, a substantial constant penalty for any production of the externality in excess of this stipulated level, and a positive marginal penalty applied to each unit of the externality which is produced in excess of the stipulated level.*

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*Roberts (93), p. 22.

4.1.3 Synthesis

The numerous and varied proposals which have been advanced for the adoption of particular internalization mechanisms in particular externality situations lead inevitably to the conclusion that there exists no single mechanism for the internalization of externalities which uniformly constitutes the socially most desirable internalization mechanism in all externality situations. Rather, the appropriate internalization mechanism for any particular externality situation can be determined only after a careful evaluation of the relative strengths and weaknesses of each available alternative internalization mechanism in that situation has been completed. For, as Coase asserts:

> "All solutions have costs and there is no reason to suppose that government regulation is called for simply because the problem is not well handled by the market or the firm. Satisfactory views on policy can only come from a patient study of how, in practice, the market, firms and governments handle the problem of harmful effects."**

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*The use of mixed internalization mechanisms of this type are advocated in Roberts (93), pp. 74-79.

**Coase (19), p. 17.

Yet, Davis and Kamien offer a specific recommendation concerning the appropriate method of performing this study. In particular, they assert:

> "The tools of cost-benefit analysis appear to provide the proper perspective. In a given situation, the policymaker should consider the problem and imagine the application of each of the alternative approaches to it. The principle of selection is simple. Each measure of policy (including that of doing nothing) will have costs and benefits associated with it. The policymaker should select that measure for implementation which produces the greatest net benefits.*

Nevertheless, since the costs and benefits which are attributable to the adoption of any particular internalization mechanism differ both among resource owners and among externality situations, it is reasonable that a variety of different internalization mechanisms should exist simultaneously.

4.2 Public Goods

A pure public good is a good which is consumed collectively by all members of society in the sense that the consumption of the good by one individual does not reduce the satisfaction which can be obtained by any other individual from his consumption of the good. Since each unit of a pure public good can be consumed simultaneously by all members of society, the marginal value to society of any particular unit of this good will be equal to the sum of the marginal values which are attached to this unit of the good by all members of society. Therefore, to attain economic efficiency in the provision of a pure public good, society should expand its production of this good to that level of output at which this sum is equal to the marginal cost which must be incurred by society in producing an additional unit of the good. This societal decision rule can be expressed mathematically as:

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*Davis and Kamien (28), p. 86.

$$\sum_{j=1}^{s} MRS_i^j = MRT_i$$

where MRS_i^j = the marginal value which is attached to pure public good i by individual j (i.e., individual j's marginal rate of substitution for pure public good i);

MRT_i = the marginal cost to society of pure public good i (i.e., the marginal rate of transformation of pure public good i); and

s = the total number of members of society.*

Unless the production function of society exhibits increasing returns to scale, satisfaction of this condition will guarantee that society will produce each unit of the pure public good whose marginal value to society equals or exceeds its marginal cost to society and will refrain from producing each unit of the good whose marginal cost to society exceeds its marginal value to society. Thus, no modification of the rate of production of this good will provide incremental benefits to society which exceed the marginal cost to society of performing the modification.

Having determined the optimal rate of production of a pure public good, it is necessary to specify the optimal pattern of consumption of this good by the various members of society. The opportunity to consume any existing quantity of this good can be granted to additional members of society without affecting the satisfaction which is obtained from its consumption by those members of society who initially have been consuming the good. Therefore, any allocative mechanism which excludes any individual member of society from the consumption of any individual unit of the good will be economically inefficient because it will reduce the satisfaction of that member of society who is excluded from consumption without increasing the satisfaction of any other member of society. Even if it is practicable to exclude some members of society from the consumption of some units of a pure public good, performing this exclusion will be socially undesirable because the attainment of economic efficiency requires that all members of society must be granted free access to the consumption of all units of that good. Therefore, the socially optimal price which should be charged for the right to consume a pure public good is zero.

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*See Samuelson (102) and Samuelson (99) for a mathematic derivation and a graphical derivation, respectively, of this optimality condition.

However, if a price of zero is charged for the right to consume each unit of a pure public good, some mechanism other than the price system must be employed to finance the provision of this good. Moreover, if the financing mechanism which ultimately is adopted is to promote unambiguously the attainment of economic efficiency, this mechanism must guarantee that each citizen's contribution to defray the cost of providing the pure public good does not exceed the value of the total benefits obtained by that citizen from his consumption of the good. Unless this condition is satisfied, one or more members of society will suffer a decrease in their satisfaction as a result of the provision of the pure public good. Yet, at the socially optimal level of total production of this good, the value of the marginal benefit which is obtained by society from each unit of the good which is provided must equal or exceed the marginal cost which is incurred by society in providing that unit of the good. Therefore, the value of the total benefit which is obtained by society from the provision of the socially optimal quantity of the good must equal or exceed the total cost which is incurred by society in providing this quantity of the good. Consequently, there must exist at least one financing mechanism for which this distributional provision will be fulfilled. In fact, it generally will be possible to satisfy this condition with an infinite number of alternative financing mechanisms which are differentiated solely by the relative magnitudes of the values of the net benefits which are obtained by the various members of society.

4.2.1 The Inefficiency of Decentralized Provision of Public Goods

Since the consumption of a pure public good by any individual does not diminish the satisfaction which other individuals can obtain from their consumption of the good and since it is economically inefficient, if not impossible, to exclude any individual from the consumption of the good, it is theoretically impossible for a decentralized market mechanism to induce the economically efficient provision of a pure public good. In particular, when these circumstances prevail, each citizen's consumption of the existing quantity of the good will be totally independent of the magnitude of his contribution to the financing of the cost of providing the good. Moreover, if the population of the society is sufficiently large that the value of the benefits which any particular citizen obtains from his consumption of this good represents an insignificant portion of the value of the total benefits which are obtained by all members of society from their consumption of the good, a decision by any particular citizen to refrain to any extent from contributing toward the provision of the good will have no noticeable effect upon either the total quantity of the good which is available for consumption or, consequently, the total satisfaction which this citizen obtains from his consumption of the good. Therefore, it will be individually rational for each member of society to volunteer to contribute toward the provision of any particular quantity of a pure public good an amount of income which is substantially less than the maximum amount which he ultimately would be willing to surrender in exchange for the provision of that quantity of the good. Yet, if each member of society adopts this individually rational behavior pattern, the cumulative result of these independent, decentralized actions will be the provision of an economically inefficiently small quantity of the good.

Moreover, if the society initially achieves an equilibrium in which an inefficiently small quantity of a pure public good is produced, any individual citizen who independently attempts to rectify this inefficiency will be required to finance the entire marginal cost of any incremental production of the good which he provides; while he will obtain only an insignificant portion of the value of the marginal benefits which are obtained by all members of society as a result of this expansion of production. Consequently, it is extremely unlikely that independent, decentralized action will successfully increase the production of any pure public good from any inefficiently low initial equilibrium level to the economically efficient level of output.

Therefore, it can reasonably be concluded that independent, decentralized decision-making is generally incapable of achieving the economically efficient provision of a pure public good. Instead, it is virtually inevitable that it will be necessary to rely upon some centralized resource allocation mechanism to promote the production of the most socially desirable quantity of any good of this type.

4.2.2 The Centralized Provision of Public Goods

Any system of lump-sum taxes which requires each member of society to contribute toward the provision of a pure public good an amount of income or wealth which does not exceed the value of the benefits which this individual obtains from his consumption of that good will constitute an economically efficient mechanism to finance the provision of the good. Moreover, only if the value of the total benefits which are obtained by all members of society from their consumption of the good is identically equal to the total cost to society of providing this good will there exist only one system of lump-sum taxes which will meet these specifications. Thus, in general, if the provision of a pure public good is potentially socially desirable (i.e., if total societal costs do not exceed the value of total societal benefits), there will exist an infinite number of economically efficient systems of lump-sum taxes to finance the provision of this good.

Unfortunately, the accurate specification of any of these economically efficient taxation systems requires detailed knowledge of the willingness of each member of society to pay for the provision of the good. In the absence of governmental omniscience, this specific information can only be obtained by consulting those members of society. However, these individuals almost invariably will realize that their revelation of this knowledge can and will be used as the basis for the imposition of a tax upon them. Therefore, they rationally will understate their willingness to pay for the provision of the good, since they will be able to consume the entire available quantity of the good regardless of the extent to which they contribute to the financing of the cost of its provision.

Consequently, the government will be obliged to rely upon imperfect estimates of the willingness of these citizens to pay for the provision of the public good as the primary basis for the development of any system of lump-sum taxes. Hence, in general, the tax systems which actually are implemented to finance the provision of pure public goods will not constitute economically efficient mechanisms for achieving this objective. The ultimate consequences of this theoretical impossibility of obtaining accurate information concerning the preferences of each member of society relative to the provision of a pure public good include not only the inability of government to identify an economically efficient taxation mechanism to finance the provision of this good, but also the incapacity of the public sector to determine the most socially desirable quantity of the good to provide.

These theoretical difficulties are compounded by the practical problem that the taxation mechanisms which actually are available for implementation by the government do not include the neutral lump-sum taxes which are required for the attainment of economic efficiency. Although, in theory, it is possible to develop a pure income tax or a pure wealth tax which is functionally equivalent to any particular lump-sum tax, the available income and wealth taxes which actually can be employed to finance the provision of public services incorporate variable marginal tax rates and multiple exemptions from taxation which inevitably distort the allocation of resources which is achieved at equilibrium.

Thus, although the conceptual specification of the conditions which must be satisfied to guarantee the attainment of economic efficiency in the provision of a pure public good is a relatively simple exercise, the development and implementation of mechanisms to promote the fulfillment of these conditions encounter numerous practical and theoretical difficulties. Yet, somewhat paradoxically, the failure of the attributes of most of the goods and services which actually are provided by the public sector to conform perfectly to the attributes which are characteristic of pure public goods may, in many instances, enhance the ability of the government to promote the attainment of economic efficiency in the provision of those goods and services which it actually provides.

4.2.3 Exclusion and the Centralized Provision of Public Goods

Recognizing the serious theoretical and practical difficulties which hinder, if not preclude, the fulfillment of the theoretical conditions for the attainment of economic efficiency in the provision and financing of public goods, numerous researchers* have asserted that in many of those situations in which it is possible to some extent to exclude specific members of society from the consumption of a public good, it may be socially desirable to charge a positive price for the consumption of this good. Admittedly, the adoption of a pricing policy of this type for any public good will restrict society to the attainment of an economically inefficient pattern of consumption of the good at equilibrium. Specifically, this pricing policy will exclude some members of society from the consumption of some units of this good; and, theoretically, it is economically inefficient to exclude any member of society from the consumption of any unit of a public good because this exclusion will deny to that individual a net benefit whose provision imposes no cost upon any other member of society. However, this pricing policy also has the offsetting virtue that it directly provides objective information concerning the minimum amount of income which members of society are willing to surrender in exchange for the right to consume the public good. This information, which clearly reflects the cost of employing society's scarce resources in alternative uses, constitutes a valuable input into the determination of the most socially desirable quantity of the public good for the government to provide. Thus, shifting from a policy of permitting free access to a public good to all members of society to a policy of charging each member of society a positive price for the consumption of this good can produce an increase in the extent to which economic efficiency is attained in the production of the good, in exchange for a decrease in the extent to which economic efficiency is attained in the consumption of the good.

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*The exchange of ideas contained in Buchanan (14), Minasian (75), Minasian (76), Samuelson (98), Samuelson (100), and Samuelson (101), comprises a thorough analysis of this assertion. In addition, McKean and Minasian (71) provides an excellent summary of this issue.

However, this shift in policy will be effective in producing these effects only if it is possible to exclude from the consumption of the good those individuals who refuse to pay the price which is charged for the good. Yet, for a surprisingly large number of public goods, it is technologically possible to enforce some degree of exclusion from the consumption of the good upon any particular member of society. For example, even in a community which experiences widespread air pollution, it is possible to exclude some residents from the benefits of an air pollution control program merely by imposing less restrictive controls upon emitters of air pollution who are located near to these residents than the controls which are imposed upon emitters who are located at a substantial distance from these residents. Thus, even within the context of achieving a specified reduction in the total emission of air pollutants, it is possible for the government to exercise substantial control over the distribution of the benefits from this reduction in air pollution among the various residents of the community.

However, a demonstration of the technological feasibility of excluding certain individuals from the consumption of a public good does not constitute a demonstration of the social desirability of adopting a pricing policy which is capable of performing this exclusion. The costs of developing, administering, and enforcing this pricing policy may greatly exceed the net benefits which are obtained by society from the impacts which this pricing policy exerts upon the provision and consumption of this public good.

4.2.4 Synthesis

Charging a positive price for the consumption of a public good necessarily restrains society from the attainment of economic efficiency in the consumption of goods and services. Moreover, the design and implementation of a mechanism to administer a positive pricing policy may require the incurring of substantial cost by society. Conversely, the charging of a zero price for the consumption of a public good virtually precludes the attainment of economic efficiency in the production of that good, in particular, and all goods and services, in general. Consequently, for any public good, the determination of the social desirability of charging any particular price for the consumption of the good should be based upon a thorough comparison of the costs which will be incurred by society and the benefits which will be obtained by society if this pricing policy is adopted.

4.3 Increasing Returns to Scale

A production process exhibits increasing returns to scale if equal proportional increases in the utilization rates of all inputs into this process generate a greater proportional increase in the production rate of the output of the process. Thus, if the firm which operates this production process purchases its inputs in perfectly competitive markets at constant prices (or, at least, if input prices do not increase sufficiently rapidly as the firm expands its production to more than offset the increasing returns to scale), any particular proportional increase in production cost will generate a greater proportional increase in output and, hence, the average cost of producing this output will decrease as output expands. Moreover, since marginal cost must be less than average cost whenever average cost is decreasing, marginal cost must be less than average cost whenever increasing returns to scale prevail in a production process. These relationships are represented graphically in Figure 4.1, which illustrates the cost conditions which confront a firm whose production process exhibits increasing returns to scale for all feasible rates of production. In this diagram, the curve labelled AC represents the average cost which the firm must incur at each rate of production; while the curve labelled MC describes the marginal cost which is absorbed by the firm at each level of output. It is generally asserted that cost conditions of this type will exist in any enterprise whose production process requires both the incurring of substantial fixed costs before any output can be produced and, subsequently, the

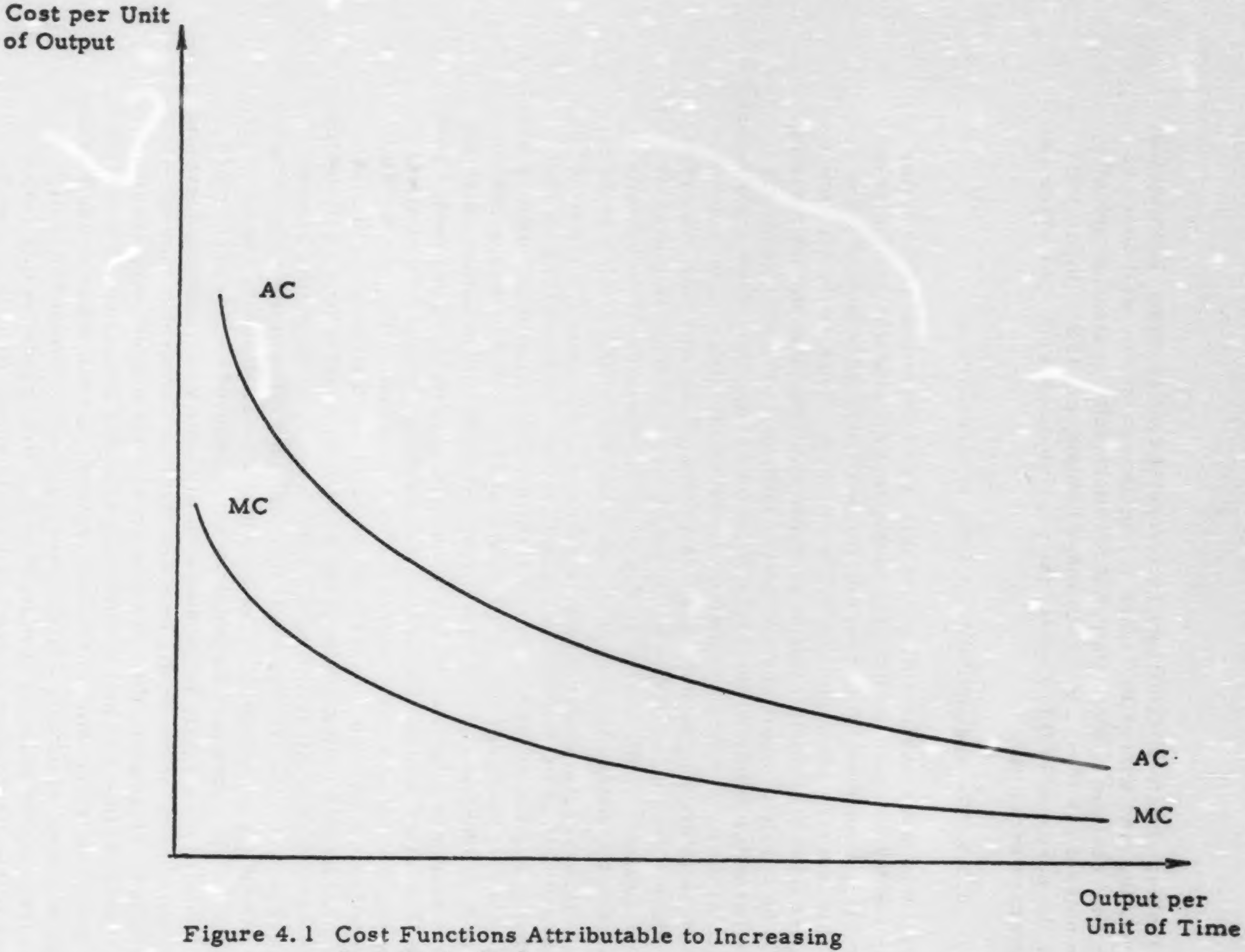

Figure 4.1 Cost Functions Attributable to Increasing Returns to Scale

absorbing of only insignificant incremental cost as output is expanded. Thus, the cost curves in Figure 4.1 might reasonably well describe the cost conditions which confront the electricity generation industry, the natural gas industry, urban mass transit, or, more importantly for the purposes of this report, the provisions of municipal water and sewerage services.

4.3.1 The Impossibility of Perfect Competition

Whenever cost conditions of this type confront all of the firms in a perfectly competitive industry throughout all relevant ranges of output, it is theoretically impossible for perfect competition to prevail in this industry when equilibrium is attained. When perfectly competitive market conditions exist in an industry, each firm in that industry will be unable to exert any noticeable influence over the prevailing market price solely on the basis of its own output decisions. Therefore, each of these firms will rationally consider this price to be a constant. Then, in attempting to maximize its profits, each firm will choose to produce its output at that rate for which price is equal to marginal cost. This situation is illustrated in Figure 4.2, where the firm initially chooses to produce the output Q_o when the prevailing market price is P_o. However, when increasing returns to scale exist for the firm, the average cost of production, AC_o, will exceed the prevailing market price (i.e., the average revenue from production) at this output level; and, hence, the firm will incur a loss of $(AC_o - P_o)$ on every unit of output which it produces. Moreover, for each unit of output which the firm produces in excess of Q_o, price will exceed marginal cost. Thus, the firm can decrease its losses by expanding its output indefinitely beyond Q_o. In fact, at production rates in excess of Q_1, the firm can actually earn positive profits. However, if each firm in the industry adopts this production strategy the prevailing market price will decline and, once again, all firms in the industry will be incurring losses. Conceivably, this process could continue until each firm in the industry is producing an infinite level of output at a market price of zero. More realistically, however, as industry output expands and market price declines, increasingly large numbers of firms will choose to leave the industry until, at the limit, only one firm -- a natural monopoly -- remains. Moreover, this outcome constitutes a necessary condition for the attainment of an economically efficient allocation of resources in any industry in which increasing returns to scale exist at equilibrium. For any level of output, a higher average cost of production will be incurred by the industry if more than one firm produces this output than if this total output is produced solely by one firm (e.g., in the

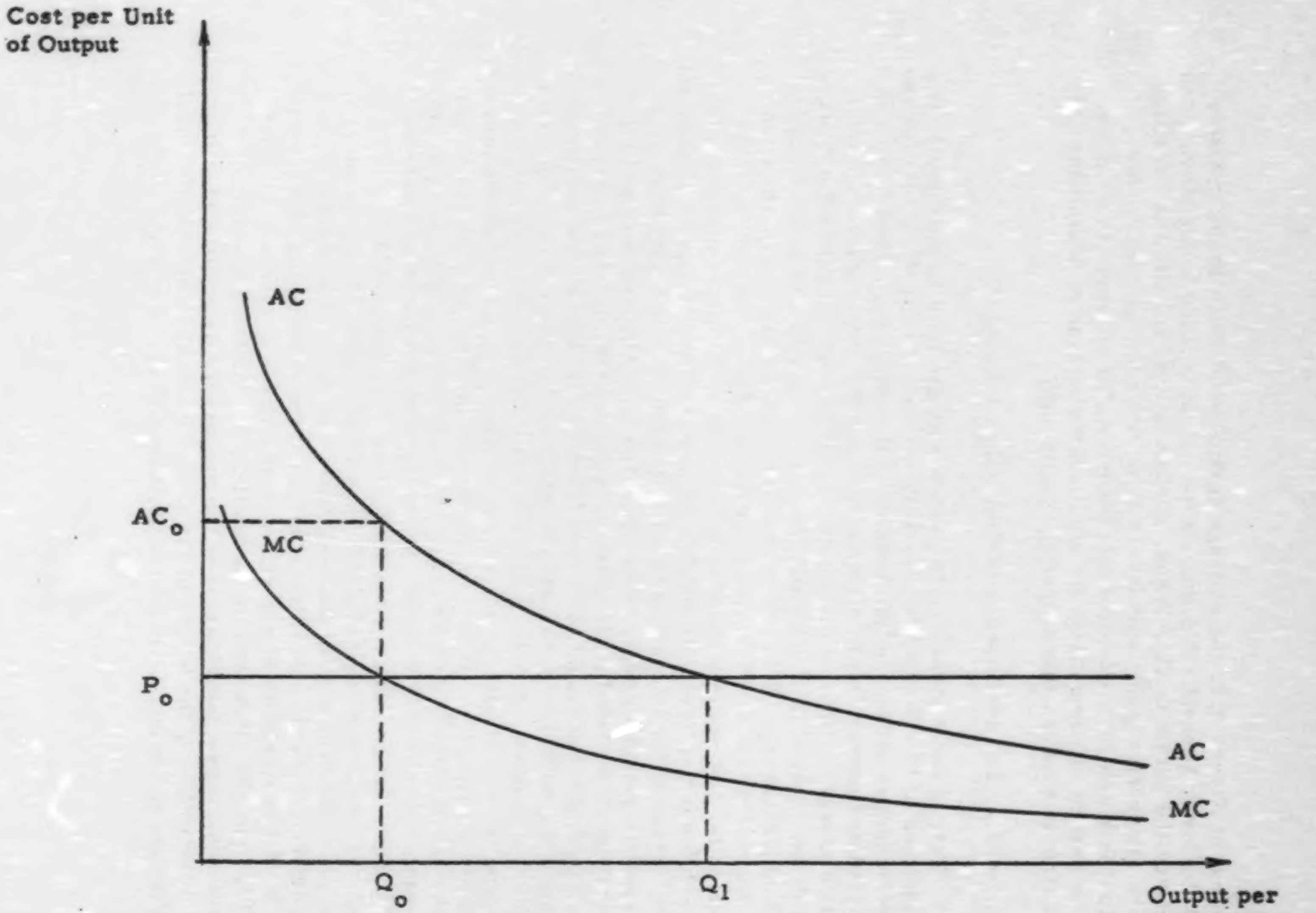

Figure 4.2 Perfect Competition Under Increasing Returns to Scale

context of Figure 4.2, the average cost of production in the industry will be lower if one firm produces the output Q_o than if two firms each produce the output $Q_o/2$). Thus, society will be required to sacrifice more alternative goods and services to obtain any particular level of output in a naturally monopolistic industry if it attempts to maintain some degree of competition in this industry instead of permitting only one firm to produce this output at equilibrium.

4.3.2 The Inefficiency of Unregulated Monopoly

Yet, if society decides to permit a single firm to monopolize the production of this output, it generally will be socially desirable for the government to initiate policies which will control the tendencies of an unregulated monopolist to allocate resources in an economically inefficient manner. Since a monopolist directly confronts the actual market demand curve for his output, he can be expected to both recognize and take advantage of the effect which his production decisions have on the market price which prevails for his product. Therefore, if the monopolist desires to maximize profits, he will choose to produce the restricted output level for which marginal revenue is equal to marginal cost instead of the economically efficient output level for which price is equal to marginal cost. This situation is illustrated in Figure 4.3, where the curve labelled D represents the market demand curve for the industry's output and the curve labelled MR depicts the marginal revenue curve which is associated with this demand curve. Confronted with these market opportunities, an unregulated profit-maximizing monopolist will choose to produce the output Q_m, for which the market will pay a price P_m. However, as is indicated by the relative heights of the demand curve and the marginal cost curve, at this level of output some member or members of society are willing to pay substantially more for an additional unit of output than the cost which must be incurred by society in producing this unit of output. Consequently, it is socially desirable to produce at least one more unit of this product. In addition, if no income effects influence the demand for this product, the social desirability of expanding production will continue to exist until output has increased to the level Q, at which the maximum amount that some individual is willing to pay for an additional unit of the product (i.e., the height of the demand curve) is identically equal to the cost to society or producing this unit (i.e., the height of the

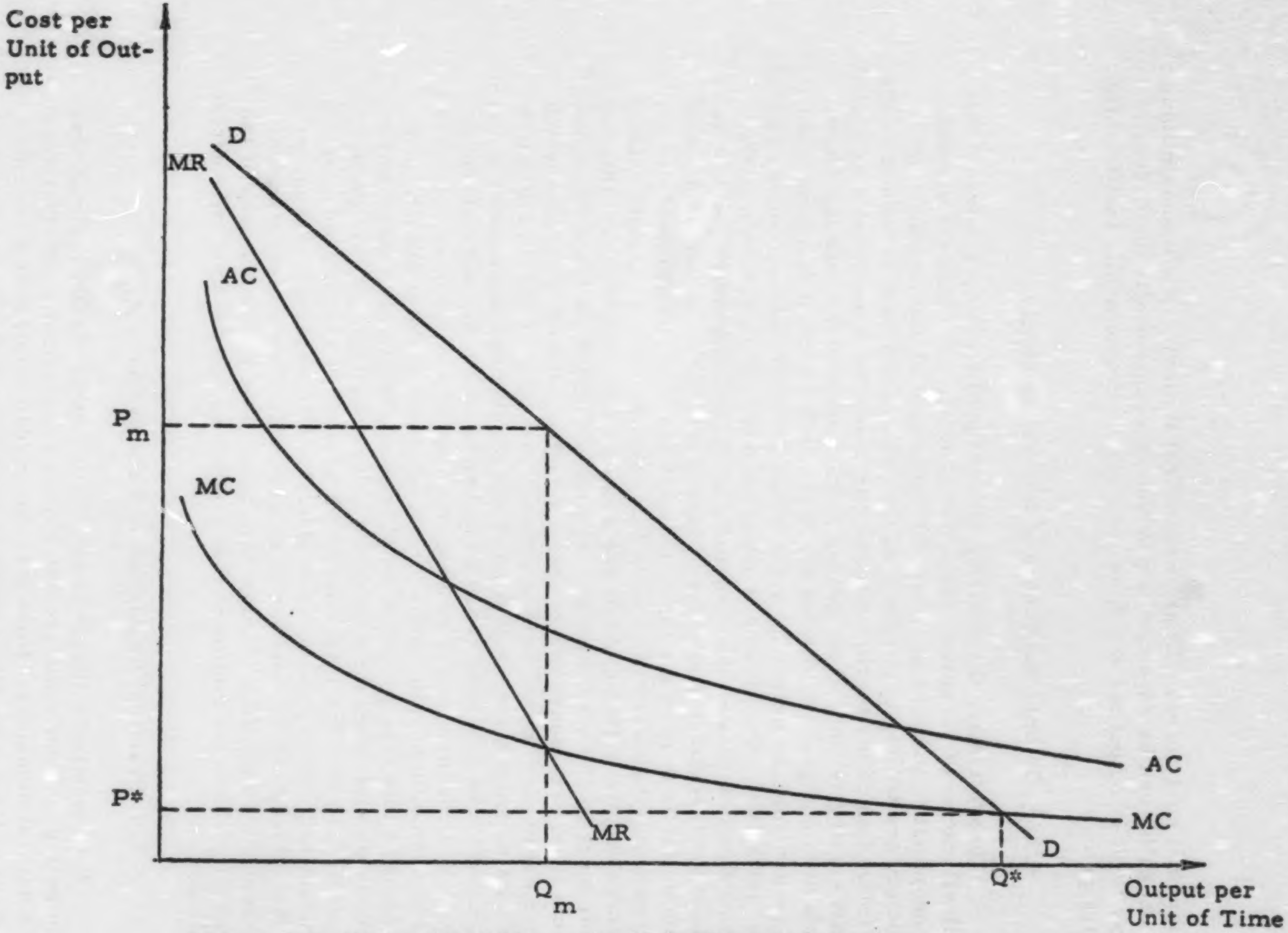

Figure 4.3 Unregulated Monopoly Under Increasing Returns to Scale

marginal cost curve). Thus, without regulation, a profit-maximizing monopolist can be expected to produce an economically inefficiently low level of output for which he receives an economically inefficiently high price.

4.3.3 Optimal Regulation of Natural Monopoly

Theoretically, the socially optimal public policy to correct this misallocation of resources consists of, first, requiring the natural monopolist to produce as many units of output as the members of society are willing to purchase at the price which is determined by the intersection of the market demand curve and the monopolist's marginal cost curve (P*) and, then, paying to the monopolist a subsidy which will fully compensate him for the loss which he would have incurred if he had sold the output Q* at the price P* in the absence of any governmental action. This policy is illustrated in Figure 4.4, where the shaded area indicates the magnitude of the subsidy which must be provided to the natural monopolist. Moreover, if the implementation of this policy is to promote the attainment of economic efficiency (i.e., to increase the satisfaction of at least one member of society without decreasing the satisfaction of any other member of society), this subsidy must be financed through a system of lump-sum taxes which collects from each consumer of this product an amount of income which does not exceed the difference between the value of the benefit which he obtains from his consumption of the product and the amount of income which he has been required to pay to obtain the units of output which he consumes (i.e., an amount of income which does not exceed his consumer's surplus from the consumption of the product). If a subsidy of this type cannot be implemented, the total benefits which society obtains from the production and consumption of this product must be less than the total cost which society incurs in producing the product and, hence, the product should not be produced. Thus, only if the subsidy can be financed in an economically efficient manner through the imposition of lump-sum taxes upon the consumers of the product will the production of this product constitute a socially desirable activity.

4.3.4 Practical Regulation of Natural Monopoly

It is relatively simple to specify the theoretically optimal taxation policy to finance the provision of an economically efficient subsidy to a natural monopoly. However, the implementation of a specific system of lump-sum taxes which is consistent with this optimal policy

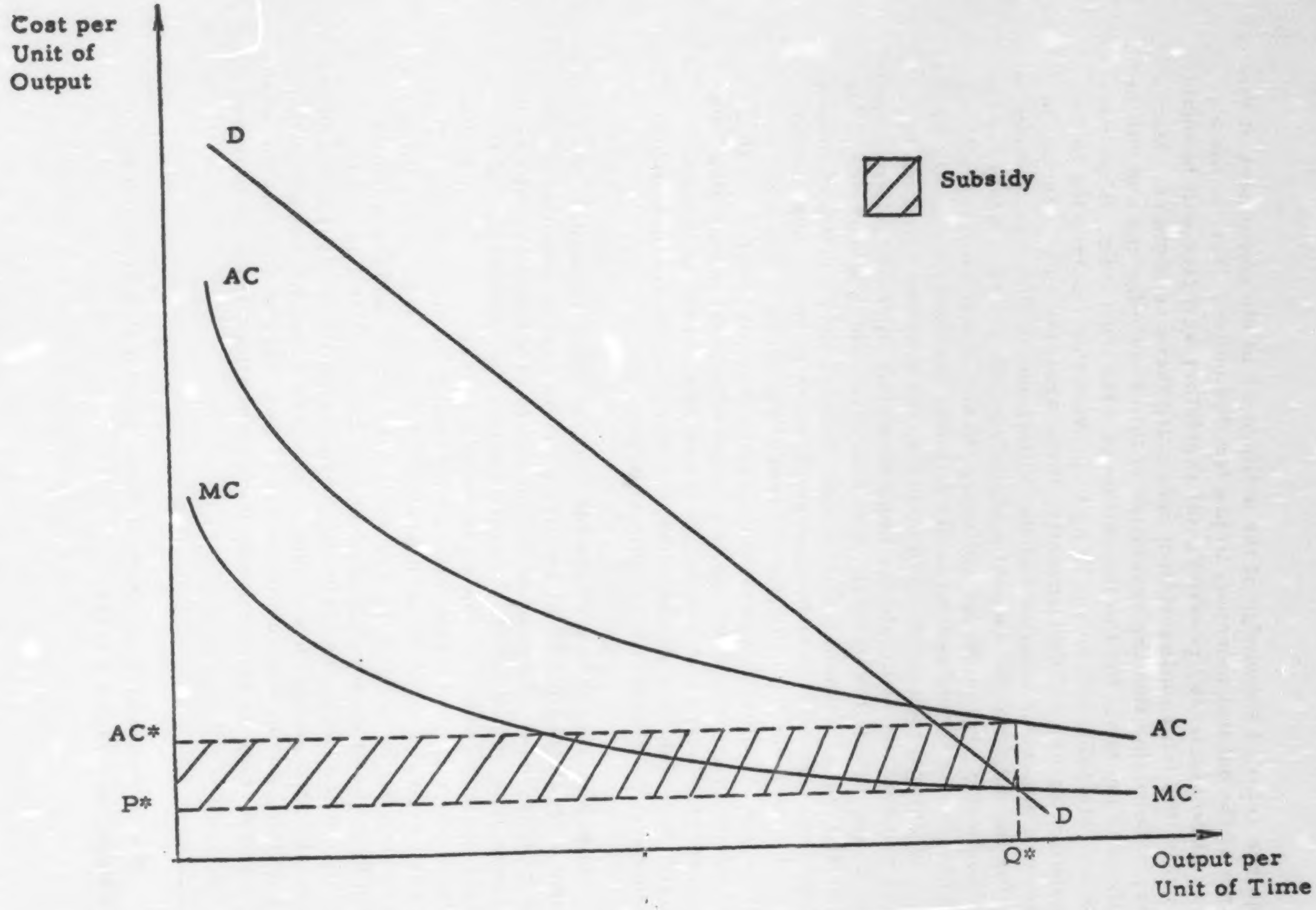

Figure 4.4 Optimally Regulated Monopoly Under Increasing Returns to Scale

requires detailed knowledge of the willingness of the consumers of the output of the natural monopoly to pay for this output. Yet, in the absence of omniscience, governmental regulatory agencies will be unable to obtain this information without consulting these consumers. Moreover, recognizing that the revelation of this knowledge can and will be utilized as the basis for the imposition of a tax upon them, these consumers rationally will be unwilling to provide this information to the regulatory agencies. Consequently, these agencies will be forced to rely upon imperfect forecasts of the willingness of these consumers to pay for the output of the natural monopoly as the primary basis for the development of their taxation policies. Hence, these policies will not necessarily constitute economically efficient mechanisms for the regulation of natural monopolies. In addition, the taxation mechanisms which are actually available for implementation by the regulatory agencies do not include the neutral lump-sum taxes which are required for the attainment of economic efficiency. Rather, they consist of income and wealth taxes with variable marginal tax rates whose application inevitably distorts the allocation of resources which is achieved at equilibrium.* Thus, the possibility arises that, in practice, a theoretically inferior policy for the regulation of natural monopolies will generate an allocation of resources at equilibrium which is more socially desirable than the equilibrium resource allocation which is produced by the theoretically optimal policy.

In particular, it is conceivable that, in some instances, the standard regulatory policy of requiring the natural monopolist to produce as many units of output as the members of society are willing to purchase at the price which is determined by the intersection of the market demand curve and the monopolist's average cost curve will be socially superior to the theoretically optimal regulatory policy. This standard regulatory policy is illustrated in Figure 4.5, where the price established by the regulatory agency is labelled P_r and the quantity which the natural monopolist produces at this price is labelled Q_r. This policy does have the virtue of guaranteeing the natural monopolist a normal return on his investment (i.e., zero economic profits) without providing any direct subsidy to him. However, it also has the weakness of producing an economically inefficient allocation of resources

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*For a thorough discussion of these practical difficulties in regulation, see Vickrey (112).

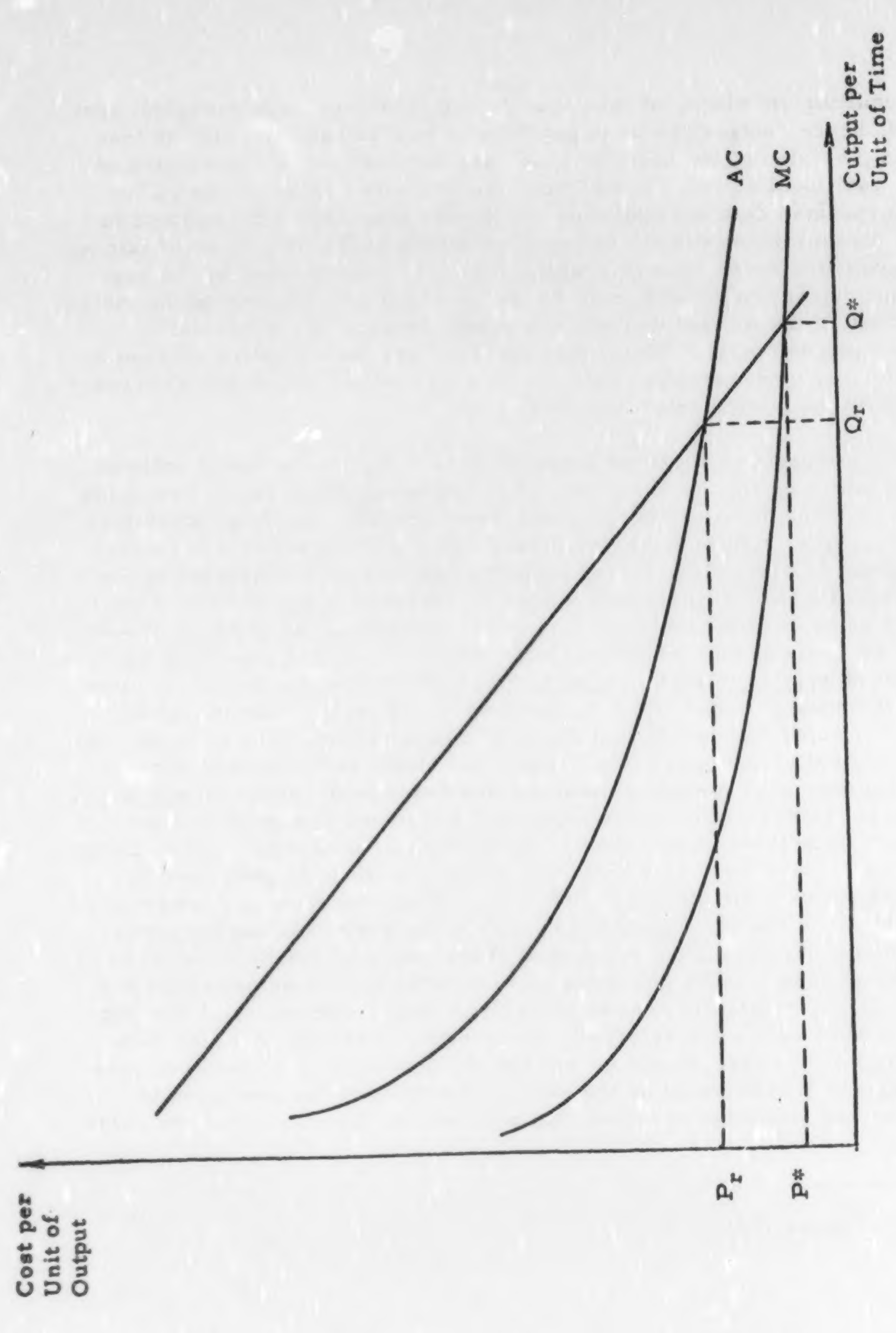

Figure 4.5 Standard Regulation of Monopoly Under Increasing Returns to Scale

at equilibrium since, at this equilibrium, price exceeds marginal cost and, hence, output can be expanded at a cost to society which is less than the value of the benefits which are obtained by the consumers of the additional output. In addition, the implementation of this policy incorporates data manipulation problems, especially with respect to the measurement and allocation of elements of fixed cost, which almost unavoidably cause the price which actually is established by the regulatory agency to deviate from the price which corresponds to the intersection of the market demand curve and the natural monopolist's average cost curve. Thus, this standard regulatory policy will not be uniformly most socially desirable in all situations which are characterized by increasing returns to scale.

Recognizing these weaknesses of both the theoretically optimal regulatory policy and the standard regulatory policy, Coase* suggests that in many natural monopoly situations socially superior allocations of resources will be achieved if multi-part pricing policies are established. In particular, Coase recommends that each consumer of the output of a natural monopoly should be required to pay at least a two-part price in which the first part is independent of the quantity of output which he purchases and reflects the direct cost of providing *any* level of service to him and the second part is directly dependent upon the quantity of output which he purchases and reflects the marginal cost of supplying an additional unit of output to him. For example, in the context of the provision of municipal water and sewerage service, an appropriate two-part pricing mechanism would consist of *both* a charge for connection to the municipal water and sewerage system which reflects the direct cost of providing this connection *and* a charge for each unit of water or sewerage service utilized by the consumer which reflects the marginal cost of providing this water or sewerage service. If the charge for connection to the system is set corrently, it should impose higher costs upon those potential development sites to which it is relatively expensive to provide water and sewerage service (i.e., relatively remote sites) than upon those potential development sites which are relatively inexpensive to serve. A connection charge of this type should encourage the development of land use patterns which economize on the use of resources in the provision of water and sewerage services. In addition, to the extent that the costs of providing water and sewerage services are positively correlated with the cost of providing water and sewerage service, this two-part pricing policy should encourage the development of land use patterns which economize on the use of resources in the provision of these other municipal services. Moreover, to the extent that the two component charges in this policy are designed to recover the total direct cost of providing the naturally monopolistic output, the ability of this policy to generate revenues which are sufficient to recover this cost will constitute a strong market test of the social desirability of producing this output. No direct test of this type exists for the theoretically optimal policy. However, the cost of developing and administering a multi-part pricing policy may be substantial and the allocation of resources which is achieved by this policy at equilibrium may be less socially desirable that the resource allocation which is generated, in practice, by the theoretically optimal policy. Therefore, it is impossible to conclude a priori that multi-part pricing is the most socially desirable policy for the regulation of natural monopoly in all situations.

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*Coase (20).

4.3.5 Synthesis

It is impossible to conclude that any single public policy constitutes the socially optimal policy for the regulation of all situations which incorporate increasing returns to scale. Rather, in each situation it is necessary to compare the relative advantages and disadvantages of all potentially applicable policies before selecting any specific policy for implementation. Once again, cost-benefit analysis appears to provide the most appropriate framework within which to conduct this comparison and, subsequently, to choose that alternative policy which can be expected to provide the greatest net benefit to society.

4.4 Conclusion

The essence of economic theory is the analysis of tradeoffs. The concepts presented in this chapter clearly demonstrate that this analysis is applicable not only to the determination by the consumer of his utility maximizing bundle of commodities or the specification by the firm of its profit-maximizing combination of inputs and outputs, but also to the selection by the government of the most socially desirable set of policy instruments for the rectification of market situations which involve externalities, public goods, or increasing returns to scale.

There exists no single public policy which is uniformly most socially desirable in the control of any of these three types of market failure. Rather, in any particular situation of any of these types, the most socially desirable public policy can be determined only on the basis of a careful comparison of the relative advantages and disadvantages of the various alternative policies which actually are available for adoption.

Nevertheless, there does exist a single analytical framework which is universally appropriate for the comparison of the strengths and weaknesses of alternative policies. This analytical framework is cost-benefit analysis, in which, first, the costs and benefits associated with the adoption of each alternative policy are enumerated and evaluated and, then, that policy which exhibits the greatest difference between total benefits and total costs is recommended for implementation.

5.0 AN EVALUATION OF THE POTENTIAL SOCIAL DESIRABILITY OF ALTERNATIVE LAND USE CONTROL MECHANISMS

Historically, the regulation of the use of private real property in the United States has been performed primarily through the enactment and implementation of muncipal zoning procedures, subdivision regulations, building codes, and eminent domain condemnation procedures. However, each of these mechanisms is restricted in its application and limited in its effectiveness by numerous administrative, economic, judicial, legal, and political problems.* Consequently, these mechanisms do not constitute, either individually or in combination, socially ideal methods for the regulation of private real property.

Therefore, the possibility that some alternative regulatory policies might be capable of producing patterns of development which are more socially desirable than the patterns of development which are produced by these traditional regulatory mechanisms warrants investigation. This chapter investigates this possibility with respect to seven innovative and, as yet, relatively untried regulatory policies. In particular, this chapter evaluates the information requirements and information retrieval considerations associated with each of these policies; the potential inequities, abuses, and enforcement problems which are likely to arise with each of these policies; the legal constraints and political considerations which might limit the applicability of each of these policies; the expected impact of each of these policies upon land use patterns; and the extent to which each of these policies promotes the attainment of the socially optimal pattern of development.**

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*See Chapter 3.0 for a detailed discussion of these issues.

**The identification of the socially optimal pattern of development in any community requires detailed knowledge of the social welfare function of that community. However, since the obtaining of this detailed knowledge inevitably is impracticable, it is generally impossible to identify this pattern of development in any community. Therefore, it is also impossible to determine the extent to which the pattern of development which is produced by any policy deviates from the socially optimal pattern of development. Nevertheless, so long as the preferences of each member of society are weighted positively in any community's social welfare function, it is possible to determine whether any change in the pattern of development of the community which is produced by any particular policy will unambiguously produce

Specifically, Section 5.1 contains an evaluation of a policy of ad valorem property taxation with tax rates conditional upon land use. A policy requiring the payment of annual "externality" fees to the government by the owners of properties upon which external effects are generated is assessed in Section 5.2. Next, Section 5.3 appraises a policy providing for the transfer of a lump-sum payment for externalities whenever the permissible land use status of any property is changed. A policy of convening public hearings to promote negotiated settlements of externality problems among all individuals who are affected by these problems is investigated in Section 5.4. Section 5.5 evaluates a policy of publicly purchasing scenic or environmental easements. A policy encouraging the formation of landowner development corporations is appraised in Section 5.6. Then, Section 5.7 assesses a policy requiring the owners of new developments to pay the full additional cost of all expansions of public facilities which must be provided to serve these new developments.

In Section 5.8, the considerations which should be taken into account in determining the most appropriate level of government to implement any of these policies are enumerated. Finally, Section 5.9 presents general conclusions and provides recommendations concerning the potential social desirability of implementing any of these prospective policies.

5.1 Ad Valorem Taxation Conditional Upon Land Use

An ad valorem tax is expressed in terms of a percentage of the sales price or market value of the item to which the tax is applied. Thus, the property tax constitutes an ad valorem tax applied to the value of land and improvements to land. This section investigates the social desirability of establishing an additional ad valorem tax on real

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an increase in social welfare. In particular, under these conditions, if any policy produces a change in the pattern of development of the community which increases the personal welfare of at least one individual without decreasing the personal welfare of any other individual, this change in the pattern of development will unambiguously increase social welfare and, hence, will unambiguously promote the attainment of social optimality.

property which attempts to exercise optimal control over the generation of externalities between private land uses by applying different ad valorem tax rates to the values of properties on which different land uses are located.

For any taxation policy to be capable of exercising optimal control over the generation of externalities between private land uses, any modification of the activity which is performed upon any parcel of land must precipitate a change in the total tax bill imposed upon the owners of this property which is equal in magnitude to the change in the external costs incurred by all other members of society which results from this modification of activity. If this condition is fulfilled by a taxation policy, any property owner who is considering any modification of the activity performed on his land will be compelled to recognize and motivated to include appropriately in his decision-making the external costs which his land use activities impose upon the remainder of society. Specifically, he will be motivated to refrain from initiating any modification of activity which will impose additional external costs upon other members of society (and, hence, will precipitate an increase in his total tax bill) in excess of the additional benefits which he will obtain from this modification of activity. Similarly, he will be motivated to adopt any modification of activity which will generate a reduction in the external costs which are incurred by the remainder of society (and, hence, will provide a decrease in his total tax bill) in excess of the decrease in total benefits which he absorbs as a result of this modification of activity.

For a policy of ad valorem property taxation with tax rates conditional upon land use to be potentially capable of producing these results, it must be possible to define an exhaustive set of mutually exclusive land use classifications such that, for each classification which is delineated, the external costs which are attributable to the pursuit upon any particular parcel of land of any activity which is in conformity with the stipulations of the classification are strictly proportional to the assessed value of the parcel. If a set of land use classifications which fulfills this requirement can be developed, it will be possible to express the external cost which is attributable to the pursuit of any land use activity upon any parcel of land as:

$$EC_i = K_j AV_i$$

where: EC_i = the external cost attributable to the activity performed upon parcel i,

K_j = the external cost per dollar of assessed value of any parcel which is attributable to the pursuit upon that parcel of any activity which is in conformity with the stipulations of land use classification j ($j = 1, \ldots, n$), and

AV_i = the assessed value of parcel i.

Then, if the activity which is performed upon parcel i is modified in a manner such that land use classification j remains applicable to the activity which is performed upon parcel i, the change in the external costs attributable to the activity performed on parcel i, ΔEC_i, will be:

$$\Delta EC_i = EC_i' - EC_i = K_j AV_i' - K_j AV_i = K_j (AV_i' - AV_i)$$

where EC_i and AV_i represent the values which prevail before the modification of activity, while EC_i' and AV_i' represent the values which exist after this modification. Similarly, if the activity which is performed upon parcel i is modified in a manner which causes a different land use classification k to be applicable to the activity which is performed upon this parcel, this change in external cost will be:

$$\Delta EC_i = EC_i' - EC_i = K_k AV_i' - K_j AV_i$$

In either event, the imposition upon each property owner of an ad valorem tax upon the assessed value of his property at the rate K_j ($j = 1, \ldots, n$) when the activity pursued upon this property conforms to the stipulations of land use classification j will cause this property owner to absorb changes in his total tax bill which are identically equal to any changes in external costs which are attributable to modifications of the activity which is performed upon his property. These changes in his total tax bill will induce each property owner to initiate each modification of activity which will provide additional benefits to society which exceed the incremental costs which will be incurred by society in performing this modification and to refrain from initiating any modification of activity which will provide additional benefits to society which are less than these incremental costs. Consequently, it can be concluded that, if an acceptable set of land use classifications can be identified, it is theoretically possible to develop a policy of ad valorem property taxation with tax rates conditional upon land use which is potentially capable of promoting the attainment of the socially optimal pattern of land use.

5.1.1 Expected Deviations from Social Optimality

The theoretical possibility of attaining social optimality through the application of a policy of ad valorem property taxation with tax rates conditional upon land use depends crucially upon the specification of an exhaustive set of mutually exclusive land use classifications such that, for each classification which is delineated, the external costs which are attributable to the pursuit upon any particular parcel of land of any activity which conforms to the stipulations of the classification are strictly proportional to the assessed value of the parcel. Superficially, although this assumption of strict proportionality is obviously strong, it does not appear to be qualitatively unreasonable. Since, in the absence of malicious behavior, a property owner will not initiate a modification of the activity which he pursues on his property which will cause an increase in the external costs which are incurred by the remainder of society unless he expects that this modification of activity will produce an increase in the return which he obtains from his property, it appears reasonable to assume that any increase in the external costs attributable to the use of a particular parcel of land will be positively related to the returns which are earned by that parcel of land.

Moreover, unless the increased returns which result from this modification of activity are purely psychic returns which are valued only by the present owner of the property, this increase in returns should produce an increase in the market value of the property as potential owners of the property increase the amount of income which they are willing to offer in exchange for the property. Thus, if the assessed value of the property increases as its market value increases, it appears generally reasonable to conclude that any increase in the external costs which are attributable to the activity which is performed upon a parcel of land will be accompanied by an increase in the assessed value of this parcel of land.

However, it cannot be concluded on the basis of this analysis that any increase in the assessed value of any parcel of land will be accompanied by an increase in the external costs which are attributable to the activity which is performed on this parcel. Rather, increases in the assessed value of a parcel of land can occur in many situations which involve no changes in the external costs which are attributable to the activity performed on this parcel. In fact, in numerous instances increases in the assessed values of properties will be associated with decreases in the external costs which are imposed upon the remainder of society by the activities pursued on these properties.

For example, installing new siding on a residential property can be expected to both increase the assessed value of the house and decrease the external costs (or increase the external benefits) which are obtained by the remainder of society from the appearance of this house. Similarly, initiating runoff control procedures on an agricultural property may both increase the productivity and, hence, the assessed value of the property and reduce the external costs which are borne by the remainder of society as a result of agricultural runoff. Finally, the installation on industrial property of pollution control equipment which has no adverse effect upon the production of the firm's desired output will both increase the assessed value of the property (to the extent that some portion of the cost of the pollution control equipment can be recovered if the firm decides to discontinue using this equipment) and reduce the external costs which are imposed upon the remainder of society by the pollution generated by the firm's production. In each of these situations, if the modification of land use activity which is undertaken does not precipitate a change in the property's land use classification, the imposition of an ad valorem tax will unambiguously produce an increase in the property owner's total tax bill; and this increase in his total tax bill will induce the property owner to refrain from adopting the modification of activity. Hence, within any land use classification which is established, the imposition of an ad valorem tax may discourage some property owners from undertaking some socially desirable actions to reduce the generation of adverse external effects.

Moreover, although this problem can be ameliorated to some extent by creating a more detailed structure of land use classifications (e.g., by distinguishing between residential properties with new siding and residential properties without new siding, between agricultural properties with runoff control procedures and agricultural properties without runoff control procedures, and between manufacturing properties with pollution control equipment and manufacturing properties without pollution control equipment) and, then, applying different ad valorem tax rates to each of these more detailed classifications, a disincentive to adopt any strategy to control the generation of external effects which does not appropriately decrease the assessed value of property will remain with each of the land use classifications which are ultimately delineated. Thus, conceivably, the theoretically optimal ad valorem taxation policy might incorporate a land use classification system which is so detailed that any modification of the activity which is performed upon any parcel of land will precipitate a change in the land use classification which is applicable to that parcel of land.

Clearly, the requirement that a property owner must accurately identify and apply two different tax rates to evaluate any prospective modification of his land use activity would cause the social desirability of implementing a policy of ad valorem property taxation with tax rates conditional upon land use at this level of complexity to be extremely dubious. Consequently, any practical policy of this type will almost invariably have to embody a land use classification system which is incapable of promoting the full attainment of the theoretically optimal pattern of development.

5.1.2 Information Requirements and Information Retrieval Considerations

The development of any policy of ad valorem property taxation with tax rates conditional upon land use requires the delineation of an acceptable system of land use classifications and the determination of the appropriate ad valorem tax rate to employ with each of these classifications. To delineate an acceptable system of land use classifications, it is necessary, first, to identify mutually exclusive sets of properties such that the ratio of the external costs which are attributable to the activity which is performed upon each property within a particular set to the assessed value of that property is reasonably constant. Then, those attributes of properties which distinguish the properties in each of these sets from the properties assigned to the other sets must be isolated. To perform these tasks, it is necessary to obtain data which specify, for at least a representative sample of the properties to which the policy will be applied, the assessed value of each property in the sample, the attributes of this property which might distinguish it from properties to which different land use classifications are likely to be assigned, and the external costs which are attributable to the activity which is performed on this property.

The data specifying the assessed value of each property in the sample can be readily obtained from existing property tax records. Similarly, a substantial amount of information concerning the attributes of each of these properties can be obtained from existing land use and municipal zoning records. Moreover, any additional information which is desired concerning these attributes can be obtained merely by conducting an inspection of the property. Thus, although the cost of collecting these data may be high (especially if sophisticated instruments are required to measure the intensity of a particular attribute), the obtaining of information concerning the attributes of each property should be technically feasible.

However, unfortunately, obtaining reasonably reliable estimates of the external costs which are attributable to the activity which is performed upon any particular parcel of land is likely to be extremely difficult, if not impossible. Conceptually, the external cost which is imposed upon any individual by the activity which is performed upon any parcel of land can be measured as the maximum amount of income which that individual would be willing to pay to avoid the adverse external effects which are generated by that activity. If the sole objective of this individual is the maximization of the profits which he earns from his property, this maximum amount of income will be equal to the difference between the profits which he will earn from his property when no external effects are generated by the activity under consideration and the profits which he will earn from his property when the existing quantity of external effects are generated. In general, reasonable estimates of this difference in profits should be obtainable from observed market data. However, if the objective of the individual who absorbs the external effects is the maximization of his satisfaction, the estimation of this maximum amount of income requires detailed knowledge of this individual's tastes and preferences -- knowledge which he generally will have no motivation to divulge accurately to the administrators of any government program.

In particular, to the extent that the individual perceives that he will never be required to surrender the amount of income which he indicates he would be willing to surrender, it will be rational for him to overstate the amount of income that he would be willing to pay to avoid any external effect in order to obtain more stringent restrictions upon the generation of this external effect. Conversely, if the number of individuals who absorb the external effect is sufficiently large that control of the external effect assumes the properties of a public good and if the individual perceives that he may be required to surrender the amount of income which he indicates that he would be willing to surrender, it will be rational for the individual to understate the amount of income that he would be willing to pay to avoid the external effect. Given the large number of potential contributors to the control of the external effect, his success in avoiding the external effect will be relatively insensitive to the amount which he contributes to its control. Thus, only when merely a few individuals are impacted by an external effect and each of these individuals believes that he will be required to surrender the amount of income which he indicates he would be willing to surrender for the control of this effect is there any reasonable expectation that an individual will provide an unbiased estimate of the maximum amount of income which he would be willing to pay to avoid the external effect. Obviously, these conditions will actually be fulfilled in only a small percentage of the situations in which the control of external effects might be socially desirable. Moreover, perversely, these accurate revelations will occur in precisely those situations in which the control of the external effect most nearly assumes the properties of a private good and, hence, can be expected to be performed through voluntary negotiation without any public intervention. Consequently, the conclusion is unavoidable that, in those situations where the attainment of social optimality without public intervention is most unlikely, the obtaining of reasonably accurate estimates of the external costs which are attributable to the activity which is pursued upon any particular parcel of land may be impossible.

Moreover, this conclusion can be stated with even greater conviction when the external effect which is absorbed by any individual is generated by a variety of different activities which are performed on several different parcels of land. In any situation of this type (e.g., the generation of air pollution or water pollution in an urban area), the accurate estimation of the external costs which are attributable to the adverse external effects generated on any particular parcel of land will require the determination of the portion of the external effects absorbed by each other member of society which are attributable to the activity performed upon that parcel of land. In many instances, this determination may be technically infeasible. Therefore, in any realistic situation, the estimates of external costs which will be obtainable for the delineation of an acceptable system of land use classification will necessarily be relatively crude.

Nevertheless, after the best attainable estimates of these external costs have been developed and, subsequently, an acceptable system of land use classifications has been specified, the best estimate of the appropriate ad valorem tax rate to employ with each of these classifications can be calculated as the quotient of the sum of the external costs which are attributable to the activities which are performed upon all of the properties in the sample to which this classification will be assigned and the sum of the assessed values of all of these properties. In addition, by carefully comparing the attributes of all of the properties in the sample to which one land use classification has been assigned to the attributes of all of the properties in the sample to which each other classification has been assigned, it should be possible to develop a set of criteria which will permit the determination of the most appropriate land use classification to assign to each parcel of land to which this ad valorem taxation policy will be applied.

However, to perform this determination, it will next be necessary to obtain information concerning the extent to which each of these parcels of land satisfies these criteria. Specifically, it will be necessary to gather information describing those attributes of each of these properties which corresponds to the attributes of the parcels in the representative sample which have been utilized to define these criteria. Moreover, to identify those instances in which modifications in the activities which are performed on parcels of land should be accompanied by changes in the land use classifications and ad valorem tax rates which are applied to these properties, it will also be necessary to monitor continually these attributes of each property to which the policy is applied. In addition, the calculation of the appropriate total tax bill to impose upon each of these properties at each point in time requires the continual reassessment of the values of the properties. Finally, to validate and, when necessary, to refine the system of land use classifications and the ad valorem tax rates to employ with these classifications, it will be desirable periodically to produce revised estimates of the external costs which are attributable to the activities which are performed on a representative sample of these properties.

Yet, after all of this information has been accumulated, the information retrieval capabilities which are required for the implementation of this taxation policy is remarkably simple. Specifically, recognizing that comprehensive data files stipulating the assessed value of each property within any municipality already have been assembled for the calculation of the standard property tax, the implementation of a policy of ad valorem property taxation with tax rates conditional upon land use requires only, first, the addition to this data file of the land use classification which has been assigned to each property in the municipality and, second, the creation of a new data file specifying the ad valorem tax rate which is employed with each land use classification. Then, to calculate the total tax bill of any property, it is necessary merely to extract from the initial data file the assessed value and the land use classification of this property; next, to retrieve from the new data file the ad valorem tax rate which applies to this land use classification; and, finally, to multiply the assessed value of the property by the ad valorem tax rate to determine the property's total tax bill. Consequently, the cost of information retrieval required for the implementation of this taxation policy should not be substantially greater than the cost of information retrieval which has been experienced with the standard property tax.

5.1.3 Potential Inequities, Abuses, and Enforcement Problems

The total tax bill which is imposed upon any property owner by a policy of ad valorem property taxation with tax rates conditional upon land use is strictly proportional to the assessed value of his property. Ostensibly, the assessed value of any property is systematically related to the market value of this property. However, because any individual parcel of land is exchanged in the market only infrequently, it is impossible to guarantee that this systematic relationship between the assessed value and the market value of each property actually exists at all points in time. In addition, the appraisal practices which are employed to determine the assessed value of a property require the application of considerable amounts of judgment by the assessor. Consequently, substantial opportunity exists for the arbitrary and preferential assessment of property values. Moreover, since the obtaining of a preferentially low assessment of the value of any property will reduce the total tax bill of the owner of this property, a motivation exists for any property owner to attempt to bribe the tax assessor to assign an unrealistically low assessed value to his property. Nevertheless, so long as the requirement that the assessed values of properties must be systematically related to the market values of these properties is retained, reasonable limits can be imposed upon the extent to which the preferential assessment of property introduces inequities or abuses into any policy of ad valorem property taxation simply by periodically comparing the assessed values of recently exchanged properties with their market prices.

Moreover, the obvious desirability of retaining this control on the unintentional or intentional introduction of inequities or abuses into the assessment and taxation of property constitutes a strong argument against the adoption of any changes in existing assessment practices intended to correct any of the deviations from social optimality which are generated by a policy of ad valorem property taxation. Thus, it generally would be inadvisable to adopt a strategy of decreasing the assessed value of a property on which a modification of activity has produced both a decrease in external costs and an increase in the market value of the property. The adoption of this strategy would destroy the linkage between assessed values and market values and, hence, would increase the probability of the arbitrary preferential assessment of property values.

In addition to being strictly proportional to the assessed value of the property, the total tax bill which is imposed upon a property by a policy of ad valorem property taxation with tax rates conditional upon land use is also sensitive to the land use classification which is assigned to the property, since this land use classification will determine the ad valorem tax rate which is applied to this property. Hence, a monitoring system must be developed to determine the initial land use classification of each parcel of land to which the policy will be applied and, subsequently, to detect the need to change the land use classification of parcels whose utilizations have been modified. This need for the continual monitoring of the activities performed on properties introduces two additional prospects for inequities and abuses.

First, the unintentional or intentional assignment of an inappropriate land use classification to any parcel of land will impose upon the owner of this parcel of land either an undesirably high or an undesirably low total tax bill. However, the probability that inequities of this type might arise can be minimized by defining the specifications which delineate each land use classification in terms of readily observable and measurable attributes of land use activities. Yet, this strategy will be effective in promoting social optimality through the application of a policy of ad valorem property taxation with tax rates conditional upon land use only if these readily observable and measurable attributes constitute those attributes which distinguish appropriately among land use classifications in terms of the promotion of the attainment of social optimality. Thus, in general, a tradeoff between the ease of monitoring land use activities and the effective promotion of social optimality must be accomplished in developing the best attainable land use classification system for any actual taxation policy of this type. Obviously, the more subtle are the distinctions between different land use classifications, the greater will be the prospects of inequities or abuses resulting from the inappropriate assignment of land use classifications to parcels of land.

In addition, inconsistencies in the temporal pattern of the monitoring of land use activities can produce further inequities in the impact of this taxation policy upon different property owners. Only a procedure which continuously monitors the activity which is performed on each parcel of land to which the policy is applied will successfully detect each modification of activity on any parcel of land which should precipitate a change in the total tax bill imposed upon that parcel of land at precisely that point in time at which this modification of activity is undertaken. Consequently, any practical monitoring procedure will necessarily produce some inequities between property owners whose modifications of activity are detected immediately after the modifications are performed and property owners whose modifications of activity are not detected until a substantial period of time has elapsed after the initiation of the modifications.

Finally, if, as is likely, the external costs which are attributable to the pursuit of any particular activity in any particular situation cannot be measured with sufficient accuracy to constitute a strongly defensible basis for the determination of the appropriate ad valorem tax rate to apply to each land use classification, the tax rates which actually are applied undoubtedly will be influenced to some extent by the political process. If this process is especially responsive to pressure exerted by potential developers, the tax rates which are applied to land use classifications whose development promises high profits to these developers are likely to be set at levels which are low relative to the socially optimal tax rates, while the tax rates which are applied to land use classifications whose continued existence retards developments which promise high profits to these developers are likely to be set at levels which are higher than the socially optimal tax rates. Conversely, if environmental activists exert excessive influence over the process through which tax rates are established, the opposite biases in tax rates are likely to be observed. However, there is no reason to believe that either of these biases will be observed generally -- or that the biases will counteract each other to produce a system of tax rates which approximates the socially optimal system. Rather, examples of both types of biases can be observed in the municipal zoning ordinances which have been adopted in various political jurisdictions; and there is no reason to believe that similar situations would not arise in the implementation of policies of ad valorem property taxation with tax rates conditional upon land use.

5.1.4 Legal Constraints and Political Acceptability

The judicial system requires that any taxation policy which is adopted by any political jurisdiction must apply uniformly to all entities which are subject to this taxation policy. In the context of a policy of ad valorem property taxation with tax rates conditional upon land use, this requirement essentially declares that any differences in the tax rates which are applied to different land use classifications must accurately reflect differences in either the demonstrable benefits obtained by society or the demonstrable costs imposed upon society by the activities which are performed upon properties to which these land use classifications have been assigned. Thus, the political jurisdiction which adopts a taxation policy of this type must be prepared to defend its land use classification system in court on the basis of the validity of both the distinctions which this classification system makes between land use activities and the appropriateness of the tax rates which are employed with the various classifications.

Moreover, although it is impossible to make any strongly defensible statements concerning the near-term political acceptability of any of the land use control mechanisms which are investigated in this chapter in the absence of comprehensive attitudinal surveys of a representative sample of political jurisdictions (which have been precluded by the resource constraints of this project), it is possible to express some general impressions of the apparent prospects for the acceptance of a policy of ad valorem property taxation with tax rates conditional upon land use by individual political jurisdictions. Specifically, to the extent that this policy is similar to the existing property tax system and is considered to be a reasonable extension of this system by the constituents of these jurisdictions, it is more likely to be politically acceptable than many of the alternative policies which are evaluated in this chapter.

However, the adoption of this policy is unlikely to provide net benefits to all of these constituents. Rather, in general, it will provide net benefits to some of these individuals and will impose net costs upon others. Therefore, the overall political acceptability of the policy will be determined by the relative influence exerted by these groups within the political process. Yet, if, as is likely, the costs arising from the adoption of this policy will be concentrated upon a relatively small number of property owners, while the benefits will be relatively widely dispersed among the remainder of the constituents of the jurisdiction, the individuals who bear the costs will be much more strongly motivated to attempt to influence the political process than will the individuals who obtain the benefits, since the benefits which result from the adoption of the policy assume the properties of a public good for these individuals. Consequently, unless the individuals who support this policy can effectively coalesce their interests, it appears likely that those individuals who oppose the adoption of a policy of this type will exert more influence over the political process than the individuals who support the adoption of the policy. This relative imbalance of political influence may produce either a failure by the political system to adopt a policy of ad valorem property taxation with tax rates conditional upon land use when the adoption of this policy would be socially desirable or, at least, the adoption of a system of tax rates which does not conform to the socially optimal system of tax rates.

5.1.5 Expected Impact on Land Use Patterns

The impact which the adoption of a policy of ad valorem property taxation with tax rates conditional upon land use will exert upon the pattern of development in any area is essentially an empirical issue which cannot be resolved definitively solely on the basis of theoretical considerations. Specifically, for any land use activity, the effect of the adoption of this taxation policy upon the continued pursuit of this activity at its present location will be determined by the effect of the adoption of the policy upon the net returns which will be generated at this location by the existing land use activity and all alternative land use activities. If the adoption of the policy causes some alternative land use activity to produce net returns which exceed the net returns which will be earned by the present land use activity by more than the cost of discontinuing the present activity and initiating the alternative activity, the alternative activity will replace the present activitity at this location. Yet, since the adoption of a policy of ad valorem taxation with tax rates conditional upon land use will impose substantially different total tax bills upon any particular parcel of land when different land use activities are pursued upon that parcel of land, it seems extremely likely that the implementation of this tax will induce substantial modifications in the land use pattern which has existed prior to the adoption of this policy. In particular, this policy should encourage the expanded development of those activities which, as a result of the policy, experience decreases in the external costs which they absorb which exceed the increases in the total tax bills which they incur; while it should encourage reductions in the pursuit of those activities which experience increases in their total tax bills which exceed the decreases in the external costs which they absorb.

Thus, it can be concluded that the adoption of a taxation policy of this type will induce the growth of some activities and discourage the growth of other activities. However, the net effect upon the overall growth rate of the entire community is generally indeterminate and cannot be predicted for any particular community without all of the detailed information which is required to develop and implement the socially optimal policy of ad valorem property taxation with tax rates conditional upon land use for that community.

5.2 Annual "Externality" Fees

For the payment of an annual "externality" fee to the government by the owner of the property on which an external effect is produced to be capable of exercising optimal control over the generation of externalities between private land uses, the fee which is imposed upon any parcel of land must be directly related to the volume of external effects which have been produced by the activity performed on this parcel during the preceding year. Specifically, the annual "externality" fee must be equal to the external costs incurred by the remainder of society which are attributable to the activity which has been performed upon this parcel during that year. If the fee is set at this level, the owner of this property will be compelled to recognize that he will be required to bear the full economic cost of any activity which he pursues on his property during any year either in the form of the direct internal costs which he incurs as he performs this activity or in the form of the fee which he pays to the government at the end of the year during which he performs this activity. Consequently, he will incorporate both of these elements of cost into each decision which he makes concerning the utilization of his property and, hence, will pursue the socially optimal utilization of this property.

However, the implementation in any single year of a system of annual "externality" fees which fulfills these conditions for each parcel of land to which this system is applied will require, in general, the identification of the portion of the total volume of external effects absorbed by each member of society which is attributable to the activity performed on each of these parcels during this year and, then, the measurement of the external costs incurred by each of these individuals as a result of his absorbing this amount of external effects during this year. Obviously, the accurate monitoring of the quantity of external effects which are absorbed by each member of society from each source of external effects during any year will, at least, be extremely expensive. In fact, if individual members of society absorb the same type of external effect (e.g., air, water, or noise pollution) from several different sources simultaneously, the identification of the portion of the total volume of this external effect which each of these individuals absorbs from each of these sources may be technically impossible. Moreover, even if the volume of external effects which each individual absorbs from each source can be identified, the accurate estimation of the external costs which this individual incurs from his absorbing these external effects will be extremely difficult, if not theoretically impossible, for the reasons discussed in detail in Section 5.1.2.

Finally, the implementation of a system of annual "externality" fees which is capable of unambiguously promoting the attainment of the socially optimal land use pattern requires the repetition of this identification and measurement process on an annual basis. Therefore, it appears virtually inevitable that the implementation of that system of annual "externality" fees which is theoretically optimal when all of the information required for the development and administration of this system is available at no cost will prove to be both prohibitively expensive and technically infeasible when the difficulty and cost of obtaining this information is taken into consideration.

Yet, a demonstration of the general social undesirability of implementing this particular system of annual "externality" fees does not constitute a demonstration of the social undesirability of implementing any system of annual "externality" fees. Rather, it is entirely possible that it might be socially desirable to develop and implement a system of annual "externality" fees which consists of, first, an exhaustive set of mutually exclusive land use classifications such that the external costs which are attributable to the performance of all activities to which any single classification is assigned are reasonably similar, while the external costs which are attributable to the performance of activities to which different classifications are assigned are demonstrably different; and, second, for each of these land use classifications, a standard annual "externality" fee which is imposed upon each property to which the classification is assigned. Consequently, the remainder of this section is devoted to an investigation of the properties of a system of annual "externality" fees of this type.

5.2.1 Expected Deviations from Social Optimality

Under any system of annual "externality" fees of this type, the fee which is imposed upon any parcel of land is unchanged by any modification of the activity performed upon this parcel of land which does not precipitate a change in the land use classification which is applicable to this parcel. Thus, this system of annual "externality" fees provides no incentives for any property owner to reduce the generation of adverse external effects by the activity performed on his property when this action will not shift this property into a different land use classification with a lower "externality" fee. Similarly, this system provides not disincentives for any property owner to increase the generation of adverse external effects by the activity performed on his property when this action will not shift this property into a different land use classification with a higher "externality" fee. Therefore, to the extent that increasing the generation of adverse external effects upon any property is consistent with increasing the profits which are earned by the activity performed on this property (or, equivalently, to the extent that controlling the generation of adverse external effects upon any property requires the accepting of a reduction in the profits which are earned by the activity performed on this property), it can reasonably be expected that, within any land use classification, the quantity of adverse external effects generated by the activity performed on any parcel of land to which this classification is assigned will tend to converge upon the maximum quantity of adverse external effects which can be generated by the activity performed on this parcel without precipitating the assignment to this parcel of a land use classification with a higher "externality" fee.

The severity of this bias in the incentives which are provided by this system of annual "externality" fees can be reduced to some extent by creating a more detailed structure of land use classifications and, then, employing different annual "externality" fees with each of these more detailed classifications. Yet, there inevitably will remain, for many properties within any land use classification which ultimately is delineated, a disincentive to initiate any reductions in the generation of adverse external effects upon these properties which will not shift the properties into different land use classifications with lower "externality" fees. In addition, any increase in the number of land use classifications which are employed in a system of annual "externality" fees will cause an increase in the difficulty and, hence, the cost of monitoring the continuing compliance of the activity performed upon each property with the stipulations of the land use classification to which this property is assigned at each point in time. The greater is the number of land use classifications which are delineated, the greater will be the frequency with which a modification of the activity performed on a property will precipitate a change in the land use classification which should be assigned to this property, and the more subtle will be the modifications of the activities performed upon parcels of land which will precipitate changes in the land use classifications assigned to these parcels of land. Therefore, increasing the number of land use classifications which are delineated in a system of annual "externality" fees will increase the optimal frequency of monitoring, the optimal sophistication of monitoring, and, hence, the cost of monitoring. Consequently, in attempting to identify the most socially desirable classification of land use for a system of annual "externality" fees, it will be necessary to balance the relatively large deviations from the socially optimal pattern of development which will be associated with the delineation of only a relatively small number of land use classifications against the relatively high monitoring costs which will be associated with the delineation of a relatively large number of classifications.

5.2.2 Information Requirements and Information Retrieval Considerations

The development of a potentially socially desirable system of annual "externality" fees requires the delineation of an acceptable system of land use classifications and the determination of the appropriate annual "externality" fee to employ with each of these classifications. To delineate an acceptable system of land use classifications, it is necessary, first, to identify mutually exclusive groups of properties such that the external costs which are attributable to the activity performed upon each property within a particular group is reasonably constant, while the external costs which are attributable to the activities performed on properties within different groups are demonstrably different. Then, those attributes of properties which distinguish the properties in each of these groups from the properties assigned to the other groups must be isolated. To perform these tasks, it is necessary to obtain data which specify, for at least a representative sample of the properties upon which annual "externality" fees will be imposed, the external costs which are attributable to the activity which is performed on each property in the sample and the attributes of this property which might distinguish it from properties to which different land use classifications are likely to be assigned.

The technical and motivational problems in the provision of reasonably accurate estimates of the external costs attributable to the performance of any activity on any parcel of land which have been described in detail in Section 5.1.2 in the context of the development of a policy of ad valorem property taxation with tax rates conditional upon land use will also prevail in the development of any system of annual "externality" fees. Consequently, once again, the estimates of external costs which will be obtainable for the delineation of an acceptable system of land use classifications will necessarily be relatively crude. Nevertheless, on the basis of these estimates, it should be possible to separate the properties in the representative sample into mutually exclusive groups which fulfill the conditions specified in the preceding paragraph.

After these mutually exclusive groups of properties have been produced, it will be necessary to identify those attributes of the properties within any particular group which distinguish these properties from the properties in the remaining groups. In general, it seems reasonable to expect that the attributes of the activity performed upon any parcel of land which will provide these distinctions will be related to those characteristics of this activity which determine the level of external costs which are attributable to its performance. Thus, to the extent that the level of external costs which are attributable to the performance of any particular activity on any parcel of land is affected by the volume of external effects which are generated by this activity and to the extent that this volume of external effects can be measured at acceptable levels of cost using technically feasible monitoring technology, the volume of external effects generated by the activity performed on the various properties in the sample should constitute an appropriate attribute to distinguish among the properties in the different groups. Similarly, to the extent that the level of external costs which are attributable to the performance of any activity on any parcel of land is affected by the characteristics of the properties -- and the activities performed upon the properties -- which incur these external costs, these characteristics of these properties should constitute reasonable attributes to distinguish among the properties in the different groups.

Thus, if the initiation of an industrial activity in an existing residential neighborhood will generate higher external costs than the initiation of this same industrial activity in an existing industrial neighborhood, the characteristics of the neighborhood in which an industrial activity is located should constitute an appropriate attribute to distinguish among the properties in some of the groups which have been identified. Similarly, if the initiation of residential land uses can impose external costs upon properties containing existing industrial activities by locating in the neighborhood of these activities and, hence, increasing the level of external costs which this industrial activity imposes upon the remainder of society (and for which this industrial activity is charged under the prevailing system of annual "externality" fees) for any volume of external effects which this industrial activity generates, the characteristics of the neighborhood in which a residential activity is located should also constitute an appropriate attribute to distinguish among the properties in different groups.*

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*Observe that this analysis implies that in any neighborhood containing a mixture of industrial and residential activities, positive annual "externality" fee should be imposed upon both properties upon which industrial activities are performed and properties upon which residential activities are pursued.

In general, a substantial amount of this desired information concerning the attributes of each of the properties in the representative sample can be obtained from existing land use and municipal zoning records. Yet, almost invariably, it will be necessary to produce some portion of this desired information through direct observation and inspection of these properties.

Nevertheless, after all of the desired information concerning the attributes of the properties in the representative sample has been assembled, it should be possible to develop a set of criteria which will permit the determination of the appropriate land use classification to assign to each parcel of land upon which an annual "externality" fee will be imposed by carefully comparing the attributes of all of the properties in each of the mutually exclusive groups of properties which have been identified to the attributes of all of the properties in each of the other mutually exclusive groups. Moreover, the annual "externality" fee which should be imposed upon each property to which any particular land use classification is assigned can be set at a level equal to the estimated external costs attributable to the activity performed upon each of the properties in the representative sample which are included in the mutually exclusive group associated with this land use classification.

However, to determine the land use classification which should be assigned to each of the properties upon which an annual "externality" fee will be imposed which is not included in the representative sample, it will be necessary to gather information describing those attributes of each of these properties which correspond to the attributes of the properties in the representative sample which have been utilized to define the set of criteria which distinguish among the various land use classifications. Moreover, to identify those instances in which modifications in the activities which are performed on parcels of land should be accompanied by changes in the land use classifications and annual "externality" fees which are applied to these properties, it will also be necessary to monitor continually these attributes of each property to which this policy is applied. Finally, to validate and, when necessary, adjust the system of land use classifications and the annual "externality" fee to employ with each of these classifications, it will be desirable periodically to produce revised estimates of the external costs which are attributable to the activities which are performed on a representative sample of these properties.

After this information has been accumulated, the information retrieval capabilities which are required for the implementation of a system of annual "externality" fees is relatively modest. Specifically, it is necessary merely to create one data file specifying the land use classification which is applicable to each parcel of land upon which an annual "externality" fee will be imposed and another data file specifying the annual "externality" fee which is employed with each land use classification. Then, to determine the annual "externality" fee which is applicable to any property at any point in time, the agency responsible for the administration of this system must only extract the land use classification of this property from the first data file and, subsequently, to retrieve the annual "externality" fee which is employed with this land use classification from the second data file. Moreover, to produce the appropriate change in the annual "externality" fee which is imposed upon any parcel in response to a modification of the activity performed on this parcel, it is necessary merely to replace the existing land use classification specified for this property in the first data file with the land use classification which is applicable to the modified activity which is presently being performed on this property.

5.2.3 Potential Inequities, Abuses, and Enforcement Problems

For the most part, the potential inequities and abuses which are likely to arise under a system of annual "externality" fees are essentially the same as the potential inequities and abuses which are likely to arise under a policy of ad valorem property taxation with tax rates conditional upon land use. Thus, since the annual "externality" fee which is imposed upon any property is determined by the land use classification which is assigned to the property, the intentional or unintentional assignment of inappropriate land use classifications to parcels of land will produce inequities in the treatment of different property owners. In addition, since the external costs which are attributable to the performance of any particular activity in any particular situation is unlikely to be measurable with sufficient accuracy to constitute a strongly defensible basis for the determination of the appropriate annual "externality" fee to employ with each land use classification, it is highly probable that the annual "externality" fees which actually are employed will be influenced to some extent by the political process.

In particular, it is likely that the annual "externality" fees which are employed with land use classifications incorporating activities performed by individuals exerting substantial political influence will be set at levels which are lower than the socially optimal fees, while the annual "externality" fees which are employed with land use classifications incorporating activities performed by individuals exerting relatively little political influence may be set at levels which are higher than the socially optimal fees. Moreover, since the establishment of inappropriate annual "externality" fees for particular land use classifications and the assignment of inappropriate land use classifications to particular parcels of land will directly affect the wealth of the owners of properties to which these inappropriate fees and classifications are applied, motivations will exist for these property owners to offer bribes to public officials for the preferential assignment of land use classifications and the preferential establishment of annual "externality" fees.

Finally, inequities in the treatment of different property owners can be produced by the inconsistent monitoring of the activities which are performed upon various parcels of land. Once again, inequities will arise between property owners whose modifications of activity are detected immediately after the modifications are performed and property owners whose modifications of activity are not detected until a substantial period of time has elapsed after the initiation of the modifications. However, the prospect of these inequities does not imply that all properties should be subjected to the same intensity of monitoring. Rather, the socially desirable intensity of monitoring of each parcel of land should be determined on the basis of both the expected probability that the activity performed upon this parcel will be modified in a manner which will precipitate a change in the land use classification which is applicable to this parcel and the magnitude of the change in external costs which can be expected to be produced by any modification of activity which is initiated on this parcel.

Nevertheless, it is imperative that a reasonable degree of intensity must be exercised in the monitoring of the activity performed upon each parcel of land upon which an annual "externality" fee is imposed. If the monitoring of the continuing compliance of the activity performed upon any parcel of land with the stipulations of the land use classification assigned to this parcel of land becomes so ineffectual that the owner of this property can reasonably assume that modifications of the activity which he performs upon his property will have no effect upon the land use classification or, hence, the annual externality fee which is assigned to this property, the property owner rationally will regard the annual "externality" fee to be a lump-sum tax -- a tax whose magnitude remains constant regardless of the activity which is performed upon the property. If this situation arises, the annual "externality" fee will exert no influence upon either the activity which is performed upon the property or the external costs which are attributable to the performance of this activity. Consequently, the effectiveness of any system of annual "externality" fees in promoting the attainment of the socially optimal pattern of development will be strongly influenced by the diligence and accuracy of the monitoring procedures which are established to administer the implementation of this system.

5.2.4 Legal Constraints and Political Acceptability

As in the case of a policy of ad valorem property taxation with tax rates conditional upon land use, the judicial system requires that any system of annual "externality" fees which is adopted by any political jurisdiction must apply uniformly to all entities which are subject to this system of fees. Essentially, this requirement declares that any differences in the annual "externality" fees which are employed with different land use classifications must accurately reflect differences in the demonstrable external costs imposed upon society by the activities which are performed upon properties to which these land use classifications have been assigned. Thus, any political jurisdiction which adopts a system of annual "externality" fees must be prepared to defend in court both the validity of the distinctions which the land use classification structure embodied in this system of annual "externality" fees makes between different land use activities and the appropriateness of the annual externality fees which are employed with the various land use classifications in this structure.

In addition to fulfilling these legal requirements, a system of annual "externality" fees must be politically acceptable within a jurisdiction before this jurisdiction will adopt the system. To the extent that this system is considered to be similar to existing fee or licensing mechanisms by the constituents of this jurisdiction, it is reasonably likely to be regarded as acceptable by these constituents. However, to the extent that these individuals view the system of annual "externality" fees as a unique and unprecedented taxation mechanism, its political acceptance by these constituents undoubtedly will require the exertion of considerable public relations efforts by its proponents.

Moreover, since any realistic system of annual "externality" fees will not provide positive net benefits to all of the constituents of the jurisdiction which is considering the adoption of a fee system, the political acceptability of any system of fees will be determined to some extent by the relative political influence of those constituents who obtain net benefits from its adoption and those constituents who incur net costs as a result of its adoption. Finally, to the extent that there is general political resistance to the adoption of any policy which increases taxes, the political acceptability of the initiation of any system of annual "externality" fees will be greater if the proposal to adopt this system is accompanied by a proposal to reduce other taxes than if the proposal to adopt the system is introduced in isolation.

5.2.5 Expected Impacts on Land Use Patterns

The impact of the adoption of a system of annual "externality" fees upon the pattern of development in any area is inevitably an empirical issue which cannot be resolved definitively solely on the basis of theoretical considerations. To the extent that the adoption of any system of this type increases the total cost of performing any particular land use activity above the cost which would have prevailed in the absence of the system, the adoption of the system will discourage the performance of this land use activity. Conversely, to the extent that the adoption of the system decreases the total cost of performing any particular land use activity (including the external costs absorbed by the activity) below the cost which would have prevailed in the absence of the system, the adoption of the system will encourage the performance of this land use activity. Any system of annual "externality" fees can be expected to produce the first type of effect in some instances and the second type of effect in other instances. Thus, the net effect of the adoption of any system of this type upon the overall growth rate of the community is generally indeterminate.

Yet, since any system of annual "externality" fees will impose substantially different fees upon any parcel of land when different land use activities are performed upon this parcel of land and since the initial application of a system of fees in any jurisdiction will significantly affect the net returns which can be earned on any parcel of land, the adoption of any system of this type in any jurisdiction can be expected to induce substantial modifications in the land use pattern which has existed in this jurisdiction prior to the adoption of the system of fees. In addition, the grosser are the distinctions between the types of land use activities to which different land use classifications are applied and the greater are the differences between the annual "externality" fees which are employed with different land use classifications, the less frequent will be the occurrence of modifications in land use activities which precipitate changes in the land use classifications assigned to parcels of land which produce increases in the annual "externality" fee imposed on these parcels and, hence, the greater will be stability of those land use activities whose modification will generate these effects. Moreover, since these incentives will exist to some extent with any system of annual "externality" fees, any system of this type will increase the temporal stability of those land use activities whose modification will produce increases in the annual "externality" fees imposed upon the parcels containing these activities.

5.3 Lump-Sum Payment for Externalities Prior to Change in Permissible Land Use Status

For a lump-sum payment for externalities which is exacted only in the event of a change in the zoning or permissible land use status of any parcel of land to be capable of exercising optimal control over the generation of externalities between private land uses, the payment which is applied to any property owner when he proposes a change in the zoning or permissible land use status of his property must be set equal to the discounted present value of the difference between the external costs which the performance of the proposed land use activity on this property will impose upon all other members of society during each year in the future and the external costs which the continued performance of the land use activity presently pursued on this property will impose upon these same individuals during each of these years when the socially optimal allocation of all other resources is attained in each of these years. If the payment is set at this level, each property owner will be required to recognize and absorb, prior to initiating upon his property any new land use activity which will require a change in zoning or other administrative approval, the total incremental costs which will be incurred by all members of society (i.e., both changes in his own internal costs and changes in the external costs absorbed by the remainder of society) if the new activity is introduced. Consequently, a property owner will not choose to initiate any new land use activity on his property unless the future benefits which he expects to obtain from the performance of this activity exceed the total future costs which all members of society expect to incur if this activity is performed on this property; and, hence, he will pursue the socially optimal utilization of his property.

Clearly, if lump-sum payments for externalities are to encourage appropriately the initiation of new land use activities which will produce decreases in the discounted present value of the external costs which are attributable to the activities which are performed upon particular parcels of land, the payments for externalities must flow from the government to the owners of these properties (i.e., subsidies must be paid to property owners) in these instances. Conversely, if these payments are to discourage appropriately the initiation of new land use activities which will generate increases in the discounted present value of these external costs, the payments must flow from property owners to the government (i.e., fees must be paid to the government).

In addition, since lump-sum payments for externalities must be made only when designated events occur (e.g., the approval of an application for a change in the zoning or the permissible land use status of a property), the unambiguous promotion of the attainment of social optimality through the application of payments of this type requires that a designated event must occur whenever a modification of the activity which is performed upon any parcel of land changes the discounted present value of the external costs which are attributable to the activity performed on that parcel. Thus, for example, requiring a lump-sum payment for externalities on each occasion when a change in zoning is approved will unambiguously promote the attainment of social optimality only if a change in zoning is required in every instance in which a change in the activity performed on a parcel of land will change the discounted present value of the external costs which are incurred by society. For this condition to be fulfilled, the land use classifications delineated in the existing municipal zoning ordinance must constitute an exhaustive set of mutually exclusive land use classifications such that the discounted present value of the external costs which are attributable to the performance of all of the activities included within any single classification are identical, while the discounted present value of the external costs which are attributable to the performance of activities included in different classifications may be demonstrably different.

Ostensibly, the land use classifications which are delineated within any municipal zoning ordinance should exhibit precisely these properties. However, the frequent occurrence of attempts by zoning administrators and concerned citizens to impose, upon property owners requesting changes in zoning, constraints which would permit these property owners to pursue upon their properties only a subset of the land use activities which are generally permissible on properties to which the requested land use classifications are applied strongly implies that these zoning administrators and concerned citizens do not believe that the external costs which are attributable to the various activities whose performance is permitted within any of these land use classifications are identical. To the extent that the objections of these individuals are justified, the promotion of the attainment of social optimality through the imposition of lump-sum payments for externalities will necessitate the making of lump-sum payments in many situations in which changes in zoning are not presently required.

Consequently, if the theoretically optimal control of the generation of externalities between private land uses is desired, it will be necessary, in general, to develop a new land use classification system such that the discounted present value of the external costs which are attributable to the performance of all of the activities included within any single classification are identical and, then, to require that any modification of the activity performed on any parcel of land which precipitates a change in the land use classification which is applicable to the parcel must be formally approved by the agency which is responsible for the collection or dispensation of the lump-sum payments.*

However, the implementation of a system of lump-sum payments for externalities which fulfills these conditions for each parcel of land to which this system is applied will, in general, be socially undesirable. In particular, the collection or dispensation of lump-sum payments for externalities will, in numerous instances involving minor modifications of activities, require the agency which is responsible for the administration of this system to incur costs in processing requests for changes in permissible land use status, performing the collection or dispensation of payments, and monitoring the occurrence of these minor modifications of activities which substantially exceed the benefits which are obtained by society from the minor improvements in the prevailing pattern of development which are induced by these efforts. Therefore, instead of developing and implementing a system of lump-sum payments for externalities which collects or dispenses a payment in every instance in which a modification of the activity which is performed on any parcel of land generates a change in the discounted present value of the external costs which are attributable to the activity performed on the parcel of land, it generally will be more socially desirable to develop and implement a system of payments in which an appropriate balance has been established between the incremental costs which will be incurred by society if no lump-sum payments are provided for certain modifications of activity which generate changes in external costs and the incremental costs which will be incurred by the administrative agency if lump-sum payments are provided for these modifications of activity.

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*Clearly, if the lump-sum payments which are required when a modification of activity is initiated are set appropriately, there will be no justification for denying any request for a change in permissible land use status. Hence, the approval of any request for a change in permissible land use status should be automatic and should merely serve the purpose of requiring each property owner to reveal to the administrative agency the need for a lump-sum payment. However, since this payment frequently will flow from the property owner to the government, some penalty for failing to report a modification of land use activity to this administrative agency should be established to overcome the obvious disincentive for any property owner to report those modifications of this activity which will require him to make a payment to the government.

Essentially, a system of this type will consist of, first, an exhaustive set of mutually exclusive land use classifications such that the external costs which are attributable to the performance of all activities to which any single classification is assigned are reasonably similar while the external costs which are attributable to the performance of activities to which different classifications are assigned are demonstrably different; and, second, for each combination of two different land use classifications, a standard lump-sum payment which is collected from or dispensed to any property owner who initiates a modification of the activity performed on his property which changes the land use classification which is applicable to this property from the first of these two classifications to the second of these classifications. The remainder of this section is devoted to an analysis of the properties of a system of lump-sum payments for externalities of this type.

5.3.1 Expected Deviations from Social Optimality

Under a system of lump-sum payments for externalities of this type, no payment if collected from or dispensed to any property owner in response to a modification of the activity performed on his property if this modification of activity does not precipitate a change in the land use classification which is applicable to this property. Therefore, any system of this type will fail to provide any incentive for any property owner to initiate any modification of the activity performed on his property which reduces the external costs incurred by the remainder of society when this modification of activity will not generate a change in the land use classification assigned to the property for which he will be paid a subsidy. Similarly, it will fail to provide any disincentive for any property owner to introduce any modification of the activity performed on his property which increases the external costs incurred by the remainder of society when this modification of activity will not produce a change in the land use classification assigned to the property for which he will be compelled to make a payment to the government. Consequently, to the extent that reducing the level of external costs which are attributable to the performance of any activity requires the accepting of a reduction in the profits which are generated by the activity (and, hence, to the extent that increasing the level of external costs which are attributable to the performance of any activity is consistent with increasing the profits which are generated by the activity), it can reasonably be expected that the level of external costs which are attributable to the activity performed upon any parcel of land to which any particular land use classification is assigned will tend to converge upon the maximum level of external costs which can be generated by the activity without precipitating a change in the land use classification assigned to this parcel of land for which the owner of the parcel will be required to make a lump-sum payment to the government.

The severity of the bias in the incentives which are provided by this system of lump-sum externality payments can be reduced to some extent by delineating a more detailed structure of land use classifications and associated lump-sum payments. Yet, there inevitably will remain, for many properties within each land use classification which ultimately is delineated, a disincentive to initiate any modifications of activity which will reduce the generation of external costs but will fail to precipitate changes in the land use classifications applied to these properties for which subsidies will be paid to the owners of the properties. In addition, any increase in the number of land use classifications which are employed in a system of lump-sum payments for externalities will cause an increase in the difficulty and the cost of monitoring the continuing compliance of the activity performed upon each property with the stipulations of the land use classification to which the property is assigned at each point in time. Consequently, in attempting to delineate the most socially desirable classification of land uses for a system of this type, it will be necessary to balance the substantial deviations from the socially optimal pattern of development which arise when only a small number of land use classifications are defined against the considerable monitoring costs which prevail when a large number of land use classifications are specified.

5.3.2 Information Requirements and Information Retrieval Considerations

The development of a potentially socially desirable system of lump-sum payments for externalities requires the delineation of an acceptable system of land use classifications and the determination of the appropriate lump-sum payment to employ with each possible change in land use classifications. To delineate an acceptable system of land use classifications, it is necessary, first, to identify mutually exclusive groups of properties such that the discounted present value of the external costs which will be imposed upon society during each year in the future by the activity presently performed upon each property in any particular group when the socially optimal allocation of all other resources is attained in each of these years is reasonably constant, while the discounted present value of the external costs which will be imposed upon society during each of these years by the activities presently performed on properties within different groups under these same circumstances are demonstrably different. Then, those attributes of properties which distinguish the properties in each of these groups from the properties assigned to the other groups must be isolated.

To perform these tasks, it is necessary to obtain data which specify, for at least a representative sample of the properties to which the system of lump-sum payments for externalities will be applied, both the external costs which will be attributable to the activity which is presently performed on each property in the sample during each year in the future when the socially optimal allocation of all other resources is attained in each of these years and the attributes of this property which might distinguish it from properties to which different land use classifications are likely to be assigned. In addition, the determination of these external costs for any property requires the identification of the socially optimal allocation of all other resources in each year in the future and, then, the measurement of the external costs which will be incurred by all other members of society as a result of the activity performed on this property when these allocations of resources prevail in each of these years. Finally, to permit the calculation of the discounted present value of these external costs, it will be necessary to determine the appropriate interest rate at which these external costs should be discounted.

However, the identification of the socially optimal allocation of resources in any single year requires knowledge of both the supply of, and the demand for, each good in the economy in this year and any imperfections (e.g., externality, public good, or natural monopoly problems) which exist in the market for any of these goods in this year. The obtaining of reasonably accurate information concerning these topics for even the current year constitutes an extremely difficult task; and the obtaining of reasonably accurate forecasts of this information for years in the increasingly distant future is even more difficult.

Moreover, even if acceptable forecasts of the socially optimal allocation of resources can be generated for each year in the future, the estimation of the external costs which the activity performed on each parcel in the representative sample will impose upon the remainder of society during each year in the future if the forecasted allocation of resources prevails in each of these years will inevitably encounter substantial problems. In particular, the technical and motivational problems in the estimation of the external costs attributable to the performance of any activity on any parcel of land which have been described in detail in Section 5.1.2 will prevail once again in the development of a system of lump-sum payments for externalities. Consequently, the estimates of external costs which are obtainable for even the current year will necessarily be relatively crude. Moreover, because any individual's estimate of his willingness to pay for the control of externalities becomes more speculative as the time period for which this estimate is produced lies further in the future (indeed the determination of the identities or, even, the characteristics of the individuals who will be affected by these externalities becomes more speculative as the time period for which this determination is performed lies further in the future), the estimates of external costs which will be obtainable for years in the increasingly distant future will undoubtedly be even less reliable than the estimates which are obtainable for the current year.

Yet, the process through which the calculation of the discounted present value of these external costs is performed attaches monotonically decreasing weights to external costs which are incurred in the increasingly distant future. Therefore, the impact upon the estimated discounted present value of these external costs of an error of any particular magnitude in the estimated value of the external costs incurred in any particular year will diminish as the year for which this error in measurement occurs lies further in the future. Nevertheless, these errors of measurement will adversely affect the appropriateness of the payments which are made under a system of lump-sum payments for externalities relative to the appropriateness of the payments which are made under any policy whose tax or fee structure is determined solely on the basis of cost and benefit estimates for the current time period.

Finally, even if acceptable estimates of the external costs which will be attributable to the activity which is presently performed on each property in the sample can be provided for each year in the future, the problem of identifying the appropriate interest rate at which to discount these external costs remains. Theoretically, for each individual who incurs external costs, this interest rate should be equal to the rate of interest at which this individual is able to borrow or lend in the market.* However, since there exists no single interest rate at which all individuals can borrow and lend in the market, it will be necessary to employ an average of the various interest rates which prevail in the market during the year as an estimate of the appropriate interest rate to use in the discounting of external costs for that year. Obviously, since the years for which external costs must be discounted to calculate the desired present value all lie in the future, imperfect forecasts of these average market interest rates will have to be utilized in this discounting process.

Recognizing all of these empirical and theoretical difficulties associated with obtaining the basic information required for the estimation of the discounted present value of the external costs which will be imposed upon society during each year in the future by the activity presently performed upon each property in the representative sample when the socially optimal allocation of all other resources is attained in each of these years, it is obvious that any system of lump-sum payments for externalities will be forced to rely upon relatively crude approximations of the true discounted present values of these external costs in its formulation. Nevertheless, on the basis of these approximations, it should be possible to separate the properties in the representative sample into mutually exclusive groups such that the estimated discounted present value of these external costs is reasonably constant for each property within each group, but is noticeably different for properties within different groups.

After these mutually exclusive groups have been produced, it will be necessary to identify those attributes of the properties within any particular group which distinguish these properties from the properties in the remaining groups. Once again, it seems reasonable to expect that the attributes of the activity performed upon any parcel of land which will provide these distinctions will be related to those characteristics of this activity which determine the level of external costs which are attributable to its performance. Moreover, once again, a substantial portion of the information concerning these attributes undoubtedly can be obtained for each of the properties in the representative sample from existing land use and municipal zoning records; while obtaining the remainder of this desired information invariably will require direct observation and inspection of these properties.

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*See Hirshliefer (51).

Yet, after all of this information has been assembled, it should be possible to develop a set of criteria which will permit the determination of the appropriate land use classification to assign to each property to which a lump-sum payment for externalities might be applied by carefully comparing the attributes of all of the properties in each of the mutually exclusive groups of properties which have been identified to the attributes of all of the properties in each of the other mutually exclusive groups. Moreover, the lump-sum payment which should be applied to each parcel of land for which a modification of activity has been proposed which will cause the land use classification assigned to the parcel to change from any particular classification to any other particular classification can be set equal to the difference between the estimated discounted present value of the external costs attributable to the activity performed upon each of the properties in the representative sample which are included in the mutually exclusive group associated with the proposed classification of the parcel and the estimated discounted present value of the external costs attributable to the activity performed upon each of the properties in the sample which are included in the group associated with the initial classification of the parcel. If this difference is positive, the lump-sum payment for externalities must flow from the owner of the parcel of land to the government (i.e., a fee must be paid to the government); while if this difference is negative, the payment should flow in the opposite direction (i.e., a subsidy must be paid to the property owner).

Then, to determine the land use classification which should be assigned to each of the properties to which a lump-sum payment for externalities might be applied which is not included in the representative sample, it will be necessary to assemble information describing those attributes of each of these properties which correspond to the attributes of the properties in the representative sample which have been utilized to define the set of criteria which distinguish among the various land use classifications. In addition, to identify those instances in which modifications in the activities which are performed on parcels of land should be accompanied by changes in the land use classifications which are applied to these properties and the collection or dispensation of lump-sum payments, it will also be necessary to monitor continually these attributes of each property to which a lump-sum payment might be applied. Finally, to substantiate and, when necessary, adjust the structure of land use classifications and the lump-sum payments to employ for changes in these classifications, it will be desirable periodically to produce revised estimates of the external costs which are attributable to the activities performed on a representative sample of these properties during each year in the future.

After all of this information has been assembled, the information retrieval requirements for the implementation of a system of lump-sum payments for externalities is modest. In particular, it is necessary to create only two data files: one specifying the current land use classification which is applicable to each parcel of land to which a lump-sum payment for externalities might be applied and one specifying the lump-sum payment which will be applied to each parcel of land on which a modification of activity is initiated which will cause the land use classification assigned to the parcel to change from any one particular classification to any other particular classification. Then, to determine the lump-sum payment which is applicable to any parcel of land when the activity performed on the property is appropriately modified, the agency responsible for the administration of this system must merely extract the current land use classification of the property from the first data file and, subsequently, to retrieve the lump-sum payment for externalities associated with this initial land use classification and the proposed land use classification of the property from the second data file. Finally, to update the first data file after the land use classification assigned to any property has been changed, it is necessary merely to replace the initial land use classification specified for the property in this file with the land use classification which is applicable to the property after the activity performed on the property has been modified.

5.3.3 Potential Inequities, Abuses, and Enforcement Problems

To a large extent, the potential inequities and abuses which are likely to arise under a system of lump-sum payments for externalities are very similar to the potential inequities and abuses which are likely to arise under either a policy of ad valorem property taxation with tax rates conditional upon land use or a system of annual "externality" fees. Thus, since the lump-sum payment which is applied to a parcel of land on which a modification of activity has been initiated is determined by both the land use classification assigned to the property prior to the modification of activity and the land use classification assigned to the property after the modification of activity, the intentional or unintentional assignment of inappropriate land use classifications to parcels of land either initially or subsequent to modifications of the activities performed upon these parcels will produce inequities in the treatment of different property owners.

In addition, since the discounted present value of the external costs which are attributable to the performance of any particular activity in any particular situation is unlikely to be measurable with sufficient accuracy to constitute an incontestable basis for the determination of the appropriate lump-sum payment to be applied to each possible change in land use classifications, it is extremely likely that the lump-sum payments which actually are applied will be influenced to some extent by the political process. Specifically, it is probable that the lump-sum payments which are applied to changes in land use classifications which benefit individuals who exert substantial political influence will be set at levels which are lower than the socially optimal levels (i.e., either an undesirably low fee or an undesirably high subsidy will be applied to these changes in land use classifications); while the lump-sum payments which are applied to changes in land use classifications which benefit individuals who exert little political influence may be set at levels which are higher than the socially optimal levels. Moreover, since the establishment of inappropriate lump-sum payments for externalities for particular changes in land use classifications and the assignment of inappropriate land use classifications to particular parcels of land will directly affect the wealth of the owners of properties to which these inappropriate payments and classifications are applied, motivations will exist for these property owners to offer bribes to public officials to obtain preferential assignments of land use classifications and the preferential specification of lump-sum payments for externalities.

Inequities in the treatment of different property owners can also be produced by the inconsistent monitoring of the activities which are performed upon various parcels of land. Although, formally, a system of lump-sum payments for externalities requires each property owner who intends to initiate a modification of the activity performed on his property which will precipitate a change in the land use classification applicable to the property to obtain the approval of the agency responsible for the administration of the system prior to initiating this modification of activity, property owners who intend to initiate modifications of activity which will require them to make a lump-sum payment to the government obviously have an incentive to refrain from informing this administrative agency of their intentions. To suppress this incentive, it will be necessary both to establish and enforce a substantial fine for failure to obtain approval for a modification of activity which entails a change in land use classification and to monitor the activity performed upon each parcel of land to which a lump-sum payment for externalities might be applied to determine those situations in which a fine should be levied. Yet, inequities will still arise between either property owners who obtain administrative approval prior to initiating modifications of activity or property owners whose unapproved modifications of activity are detected immediately after the modifications are performed and property owners whose unapproved modifications of activity are not detected until a substantial period of time has elapsed after the initiation of these modifications. Consequently, it is imperative that a reasonable degree of intensity must be exercised in the monitoring of the activity performed upon each parcel of land to which a lump-sum payment for externalities might be applied.

Although all of these inequities, abuses, and enforcement problems which might arise under a system of lump-sum payments for externalities are extremely similar to the inequities, abuses, and enforcement problems which might arise under either a policy of ad valorem property taxation with tax rates conditional upon land use or a system of annual "externality" fees, it is important to recognize one critical difference between the likely implications of these potential inequities, abuses, and enforcement problems for the attainment of social optimality when these different mechanisms for the control of externalities are employed. Since both a policy of ad valorem property taxation with tax rates conditional upon land uses and a system of annual "externality" fees compels the payment of charges by property owners on a regular periodic (i.e., annual) basis, the possibility of adjusting these charges to correct for errors in estimation is relatively great when these mechanisms are employed. Conversely, since a system of lump-sum payments for externalities requires the payment of fees by property owners or subsidies to property owners only on those relatively infrequent occasions when modifications of activity are initiated which entail changes in land use classifications, the probability of recognizing the social desirability of adjusting these payments to correct for errors in estimation are relatively low and, hence, the prospect of converging upon the most socially desirable system of lump-sum payments for externalities is relatively limited.

5.3.4 Legal Constraints and Political Acceptability

As with either a policy of ad valorem property taxation with tax rates conditional upon land uses or a system of annual "externality" fees, the judicial system requires that any system of lump-sum payments for externalities which is adopted by any political jurisdiction must apply uniformly to all entities to which this system of payments might be applied. Essentially, this requirement states that any differences in the lump-sum payments for externalities which are employed with different changes in land use classifications must accurately reflect differences in the changes in the discounted present values of demonstrable external costs which are attributable to the modifications of activity which are associated with these changes in land use classifications. Therefore, any political jurisdiction which adopts a system of lump-sum payments for externalities must be prepared to defend in court both the validity of the distinctions which the land use classification structure embodied within this system of lump-sum payments makes between different land use activities and the appropriateness of the lump-sum payments which are employed with the various changes in land use classification which are possible within this structure.

In addition to fulfilling these legal requirements, a system of lump-sum payments for externalities must be politically acceptable within a jurisdiction before this justification will adopt the system. To the extent that the system is regarded by the constituents of the jurisdiction as similar to existing fee or licensing mechanisms, it is reasonably likely to be considered to be acceptable by these constituents. However, to the extent that these individuals view the subsidies embodied within the system as inappropriate bribes paid to property owners for pursuing socially desirable activities which they should have pursued in the absence of any payment, rather than as appropriate compensation paid to these property owners for damages which they absorb when they restrict the activity performed on their properties, the political acceptability of the system of lump-sum payments to these constituents is dubious.

Finally, since any realistic system of lump-sum payments for externalities is unlikely to provide positive net benefits to all of the constituents of the jurisdiction which is considering the adoption of this system of payments, the political acceptability of any system of this type will, in general, be determined to some extent by the relative political influence of those constituents who expect to obtain net benefits from its adoption and those constituents who expect to incur net costs as a result of its adoption.

5.3.5 Expected Impacts on Land Use Patterns

To the extent that the adoption of any system of lump-sum payments for externalities increases the total cost of initiating any modification of land use activity above the cost which would have prevailed in the absence of the system, the adoption of the system will discourage the initiation of this modification of land use activity and, hence, will discourage the performance of the land use activity which would have been initiated if this modification of activity had been undertaken. Conversely, to the extent that the adoption of the system decreases the total cost of initiating any modification of land use activity below the cost which would have prevailed in the absence of the system, the adoption of the system will encourage the initiation of this modification of activity and, hence, will encourage the performance of the land use activity which will be initiated when this modification of activity is undertaken. Since any system of lump-sum payments for externalities will provide disincentives for the initiation of any particular land use activity in some situations and incentives for the initiation of this activity in other situations, it is impossible, in general, to determine whether the system provides a net incentive or a net disincentive for the initiation of most land use activities solely on the basis of theoretical considerations. Rather, the net effect of any system of this type in encouraging or discouraging the initiation of any land use activity almost invariably will be an empirical issue. Consequently, the net effect of the adoption of any system of lump-sum payments for externalities upon the overall growth rate of the community is also generally indeterminate.

Nevertheless, the adoption of any system of this type can be expected to exert substantial influence over the pattern of development within any community to which it is applied. Specifically, the adoption of any system of lump-sum payments for externalities can be expected to increase the incidence and stability of those land use activities whose initiation is, on balance, encouraged by the system and to decrease the incidence and stability of those land use activities whose initiation is, on balance, discouraged by the system. Moreover, since the effect of the adoption of a system of this type upon the returns which can be obtained by property owners when they undertake particular modifications of activity may be considerable, it is conceivable that the introduction of a system of this type will produce substantial changes in the pattern of development within the community which adopts the system. However, once again, whether effects of this magnitude actually will be observed constitutes an empirical issue which cannot be resolved purely on the basis of theoretical analysis.

5.4 Publicly Negotiated Settlement Among All Affected Parties

Any externality situation is reciprocal in nature. The economically rational generation of any quantity of an external diseconomy both provides benefits to the emitters of the externality and imposes costs upon the recipients of the externality. Thus, for any positive quantity of an external diseconomy which is rationally generated (i.e., generated for non-malicious reasons) by its emitters, any reduction in the generation of this externality will both provide benefits to the recipients of the externality in the form of reductions in the external costs which are incurred by these individuals and impose costs upon the emitters of the externality in the form of reductions in the profits or satisfaction obtained by these individuals. Conversely, for any quantity of an external diseconomy which is less than the quantity which would rationally be generated in the absence of any voluntary or compulsory internalization, an increase in the generation of the externality will both provide benefits to the emitters of the externality and impose costs upon the recipients of the externality. Moreover, obviously, similar reciprocal characteristics will also exist in any situation involving external economies.

Therefore, in any situation in which an externality is generated, motivations will exist for both the emitters and the recipients of the externality to explore the possibility of negotiating a mutually beneficial modification of the quantity of the externality which is currently being generated. For example, if there are no legal restrictions upon the generation of a particular external diseconomy, the recipients of the external diseconomy will be motivated to offer to the emitters of the externality some portion of any reduction in external costs which the recipients will obtain as a result of a decrease in the generation of the externality to induce the emitters to accept the reduction in their profits or satisfaction which will accompany the decrease in externality generation; while the emitters will be motivated to accept the payments which are offered by the recipients -- and, hence, to perform the requested decrease in externality generation -- if these payments exceed the costs which the emitters will incur if the requested decrease in externality generation is performed. Conversely, if there are binding legal restrictions upon the generation of the external diseconomy, the emitters will be motivated to offer to the recipients of the externality some portion of any gains which the emitters will obtain as a result of an increase in the generation of the externality to induce the recipients to agree to an appropriate relaxation of these legal restrictions and, hence, to absorb the incremental external costs associated with the increase in externality generation; while the recipients will be motivated to accept the payments which are offered by the emitters -- and, hence, to permit the requested increase in externality generation -- if these payments exceed the incremental external costs which the recipients will incur if the requested increase in externality generation is performed.

Yet, in either of these cases, it will be possible to negotiate a mutually acceptable modification in the generation of the externality only if the gains which will be obtained by the individuals who will benefit from the adoption of the modification exceed the costs which will be incurred by the individuals who will suffer decreases in welfare as a result of the adoption of the modification, since a mutually agreeable set of payments will exist only if this condition is fulfilled. Therefore, any successfully negotiated modification in the generation of an externality will necessarily increase the welfare of at least some members of society without decreasing the welfare of any other members of society and, hence, will unambiguously produce an allocation of resources which is more socially desirable than the resource allocation which would have existed in the absence of the successful negotiation.

Recognizing that a negotiated settlement among all individuals who are affected by an externality will unambiguously promote the attainment of social optimality, it becomes reasonable in any externality situation to consider holding a public hearing involving all of the individuals who are affected by the externality to facilitate the initiation of negotiations among these individuals. Moreover, to establish a basis with respect to which these negotiations can proceed, it will be necessary to specify a rigidly enforced assignment of transferable* property rights to the generation of the externality (i.e., to delineate the extent to which the emitters of the externality are legally liable for the damages caused by the externality). This assignment of property rights will determine the particular motivations which will exist for both the emitters and the recipients of the externality to engage in negotiations. Then, if there are no costs associated with arranging and enforcing any agreements which are attained in these negotiations, these motivations will induce the individuals who are affected by the externality to engage in transactions concerning the permissible generation of the externality which will proceed until all possible gains from trade have been realized and, hence, a mutually agreeable settlement providing for the economically efficient generation of the externality has been achieved. Thus, potentially, the holding of public hearings involving all individuals who are affected by particular externalities may be capable of unambiguously promoting the attainment of social optimality.

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*Property rights with respect to liability for damages are transferable if the government enforces liability rules only upon appeal by one of the parties who are involved in the externality situation. This enforcement policy introduces the possibility of exchange between these parties.

5.4.1 Expected Deviations from Social Optimality

For a negotiated settlement to be capable of attaining the socially optimal generation of an externality, the costs of arranging and enforcing the negotiated settlement must be zero. Otherwise, the individuals who are affected by the externality will rationally choose to conclude their negotiations concerning the control of the externality when they perceive that the costs which they expect to incur in arranging any additional modification in the generation of the externality exceed the gains which they expect to obtain from the performance of the modification in externality generation. Consequently, the allocation of resources which is produced by a negotiated settlement in any realistic externality situation in which the costs of arranging and enforcing a settlement of this type are positive will generally differ from the more socially desirable allocation of resources which would have been produced by a negotiated settlement in this same situation if these costs had been zero.

Moreover, unless the costs of arranging and enforcing negotiated settlements are zero, the income elasticity of demand for each good in the economy (including the externality which is the subject of the negotiations) is zero, and none of the individuals who are affected by the externality are consumers, the equilibrium allocations of resources which are attained through negotiations under alternative assignments of property rights will be different. Since most, if not all, of these conditions will fail to be fulfilled in any realistic externality situation, it will generally be true that different assignments of property rights in the generation of an externality will produce different economically efficient allocations of resources at equilibrium. Although each of these alternative resource allocations will be more socially desirable than the allocation of resources which would have prevailed if no negotiated settlement had been attained, these alternative resource allocations, in general, will not all provide the same level of social welfare. Therefore, the extent to which social optimality is attained through negotiation in any realistic externality situation will depend critically upon the initial assignment of property rights in the generation of the externality which is established in this situation. Yet, in the absence of detailed knowledge of the nature of the social welfare function, it is impossible to specify the initial assignment of property rights which will be most socially desirable in any particular externality situation. Nevertheless, it is possible to provide some general insights into the considerations which should be addressed in establishing the initial assignment of property rights and in evaluating the social desirability of relying upon publicly negotiated settlements as mechanisms for the control of externalities.

First, since positive costs of arranging negotiated settlements inhibit exchange, the extent to which negotiated settlements will produce modifications in the prevailing generation of any externality will decrease as these costs increase. Moreover, in many externality situations, the costs of arranging negotiated settlements which are associated with alternative assignments of property rights are not identical. For example, in an externality situation in which a single firm is generating smoke which adversely affects a large number of neighboring property owners, the costs of arranging a negotiated settlement are likely to be greater if the smoke-generating firm is not liable for the damages which are attributable to its activities than if the firm is fully liable for these damages. The interests of all of the neighboring property owners must be coalesced to permit the offering of a payment to the smoke-generating firm under the former assignment of property rights. Conversely, the smoke-generating firm may be able to deal with each of the neighboring property owners individually under the latter assignment of property rights. In any externality situation of this type, to the extent that the practically attainable level of social welfare is a monotonically decreasing function of the costs of arranging a negotiated settlement in the situation (i.e., to the extent that a reduction in the costs of arranging a negotiated settlement permits expanded negotiations which, in turn, promote the attainment of an equilibrium allocation of resources which provides increased social welfare), it will be socially desirable to adopt that assignment of property rights in the generation of the externality for which the costs of arranging a negotiated settlement are a minimum.

Yet, to the extent that the negotiated settlements which are attained under different assignments of property rights may incorporate extremely different distributions of welfare among the individuals who are affected by the externality, and to the extent that these differences in the distribution of welfare may significantly affect the aggregate level of social welfare which is attained, the adoption of that assignment of property rights in the generation of this externality for which the costs of arranging a negotiated solution are a minimum may not produce the highest practically attainable level of social welfare. Consequently, in selecting an initial assignment of property rights in the generation of any externality, it will generally be socially desirable to attempt to balance the various costs of arranging a negotiated settlement which are associated with the alternative assignments of property rights which have been delineated against the prospective distributional impacts of these alternative assignments. Nevertheless, obviously, unless this balancing process is performed perfectly, the allocation of resources which actually is achieved will differ from the most socially desirable resource allocation which is practically attainable.

In addition, as the number of individuals who are affected by any externality increases, the probability of attaining any mutually agreeable negotiated settlement declines. Yet, the attainment of any mutually agreeable negotiated settlement will unambiguously provide a net increase in welfare to society in the aggregate. Moreover, for any net increase in aggregate welfare, there exists an infinite number of distributions of this increase for which no member of society will achieve a lower level of personal welfare than he would have attained in the absence of a negotiated settlement. These alternative distributions of welfare are distinguished by the magnitudes of the relative shares of the aggregate increase in welfare which are obtained by the various persons who are affected by the externality. Recognizing opportunities for personal gain in a situation of this type, it becomes individually rational for each of these persons to attempt to obtain a disproportionately large share of the aggregate increase in welfare for himself by refusing to agree to any negotiated settlement which does not contain a bias in the distribution of this aggregate increase which is sufficiently favorable to him. However, if too many of the individuals who are affected by the externality employ this strategy, it is likely that there will exist no distribution of the aggregate increase in welfare which will simultaneously satisfy the various distributional constraints which have been imposed upon an acceptable settlement by all of these individuals. Other things being equal, the probability that this impasse will arise can be expected to increase as the number of individuals who are affected by the externality increases.

Whenever this impasse is confronted, additional negotiations will be required to induce relaxations of the various distributional constraints which are sufficient to permit the attainment of a mutually agreeable settlement. However, when these negotiations involve a large number of people, the attainment of a mutually agreeable settlement assumes many of the properties of a public good. In particular, if any single individual relaxes the distributional constraint which he imposes upon an acceptable settlement, he will generally provide only a marginal increase in the probability of attaining a settlement which is mutually agreeable to all of the individuals who are affected by the externality. However, he will incur the cost of his negotiated decrease in his share of the aggregate increase in welfare with certainty. Therefore, since each person's acquiescence to a relaxation of his distributional constraint will provide for him only a small expected benefit at a relatively high expected cost, it is individually rational for each person to refuse to relax his distributional constraint. Clearly, if a sufficiently large number of the persons who are affected by the externality adopt this strategy, the likely result will be a continued failure to attain a mutually agreeable negotiated settlement. Moreover, if at some point in time after this impasse develops, the individuals who are affected by the externality determine that the expected incremental cost of negotiating a mutually agreeable settlement exceeds the aggregate increase in welfare which will be obtained if a settlement is successfully negotiated, they will rationally choose not to engage in any further attempts to negotiate a settlement. Hence, no modification in the generation of the externality will be achieved.

However, as the number of individuals who are affected by the externality decreases, the extent to which any single individual's relaxation of his distributional constraint will contribute substantially to the probability of attaining a mutually agreeable negotiated settlement will increase. Consequently, it will be more rational for each individual who is affected by the externality to relax his distributional constraint; and, hence, it will be more likely that mutual agreement to a modification in the generation of the externality actually will be attained. Therefore, a mutually agreeable negotiated settlement of an externality problem is more likely to be achieved when only a small number of individuals is involved in the externality situation than when large numbers of persons are affected by the externality.

Finally, it will generally be possible to improve the prospect of attaining a negotiated settlement of any externality problem substantially by requiring less than unanimous approval of any proposal to modify the generation of the externality (i.e., by eliminating the requirement that the negotiated settlement must be mutually acceptable to all individuals who are affected by the externality). Specifically, requiring less than unanimous consent to any proposal of this type will eliminate the possibility that a small portion of the individuals who are affected by any externality will be able to preclude any modification of the generation of the externality by refusing to accept any proposed settlement which does not incorporate a distribution of the aggregate increase in welfare produced by the modification which is extremely biased in their favor. However, accepting less than the unanimous consent of all individuals who are affected by any externality as authorization for the implementation of a negotiated settlement specifying the permissible generation of the externality introduces the possibility that this implementation will cause at least some of the individuals who have declined to consent to the negotiated settlement to obtain lower levels of personal welfare when the modification in externality generation is performed than they would have obtained if the modification had not been introduced.

Thus, eliminating the requirement of unanimous approval admits the possibility that a negotiated settlement may produce changes in the equilibrium allocation of resources which are not unambiguously socially desirable. Yet, if the level of social welfare associated with the allocation of resources which is attained in any externality situation as a result of a less than unanimous negotiated settlement is greater than the level of social welfare associated with the allocation of resources which actually would have been attained in this same situation if unanimous consent had been required for the adoption of any negotiated settlement, the acceptance of less than unanimous approval of a negotiated settlement will be socially desirable in this situation. Nevertheless, in general, the allocation of resources which will be attained as a result of a less than unanimous negotiated settlement can be expected to deviate to some extent from the socially optimal resource allocation.

5.4.2 Information Requirements and Information Retrieval Considerations

In comparison with other mechanisms for the control of externalities between private land uses, the information required for the administration of publicly negotiated settlements among all individuals who are affected by an externality is extremely limited. In particular, there is no need for any agency which is responsible for the administration of settlements of this type to gather information concerning the external costs which are attributable to the generation of any externality. However, it is necessary that each individual who is affected by an externality must be aware of the costs which he will absorb himself as a result of any modification in the generation of the externality, so that he can either make appropriate offers to or appropriately accept or reject offers from the other individuals who are affected by the externality.

However, the administrative agency must collect sufficient information to identify those externality situations for which it is socially desirable to hold public hearings. Although conceivably a public hearing could be convened for every externality situation, society must incur some costs in conducting any hearing. Therefore, in general, it will be socially undesirable to insist upon conducting a public hearing in every externality situation. In particular, it is unnecessary to conduct public hearings in those situations in which the externality is voluntarily controlled without public intervention by mutually agreeable settlements among all individuals who are affected by the externalities. Similarly, the conducting of public hearings will be socially undesirable in those externality situations in which the net increases in welfare to be obtained by all members of society from the control of the externalities are less than the costs of conducting these hearings. Finally, public hearings may be socially undesirable in many externality situations which involve large numbers of emitters and recipients of the externality, where negotiations are unlikely to produce any settlements providing for modifications in the generation of the externalities.

Consequently, to identify those externality situations in which the conducting of public hearings may be socially desirable, it will be necessary, in each externality situation, for the agency which is responsible for the administration of the hearings to determine whether private negotiations already have produced mutually agreeable settlements concerning the control of the externality, to estimate the net increase in welfare which society can expect to obtain as a result of any negotiated settlement of the externality situation, to assess the costs which the agency and all of the individuals who are affected by the externality can expect to incur as a result of their participation in a public hearing concerning the situation, and to evaluate the possibility that any acceptable settlement can be negotiated among the number of individuals who are involved in the situation. Moreover, for each externality situation in which the conducting of a public hearing is determined to be socially desirable, it will be necessary for the administrative agency either to identify the property rights in the generation of the externality which have been assigned to each of the individuals who are affected by the externality or, if no assignment of property rights has been established, to assign property rights to these individuals in the manner described in Section 5.4.1.

5.4.3 Potential Inequities, Abuses, and Enforcement Problems

Especially, although not exclusively, when unanimous approval is required for the adoption of a negotiated settlement, inequities can arise whenever some of the individuals who are affected by an externality refuse to ratify any proposed settlement which does not incorporate a distribution of the net increase in aggregate welfare produced by the settlement which is not sufficiently biased in their favor. At the extreme, the adoption of this strategy by a large enough number of the individuals affected by the externality can preclude the attainment of any negotiated settlement and, hence, can deny to all of the individuals who are involved in the externality situation the increase in social welfare which could have been provided to them by a negotiated settlement. Moreover, even when a negotiated settlement is successfully attained, it is likely that the net increase in aggregate welfare produced by this settlement will be inequitably distributed in a manner which is biased in favor of those individuals who have been most intractable in the negotiation of the settlement.

Although the prospects of these inequities can be reduced by eliminating the requirement of unanimous consent as authorization for the implementation of a negotiated settlement, the relaxation of this requirement introduces the possibility that some of the individuals who are affected by the externality will attain lower levels of personal welfare with a negotiated settlement than they would have attained in the absence of a settlement. Moreover, these inequities will be most severe to the extent that the less than unanimous negotiated settlements which are attained in different externality situations systematically cause the same individuals to suffer decreases in their personal welfare.

In addition, if any of the individuals who are affected by any particular externality fail to comply with the terms of the negotiated settlement which has been attained in this externality situation (or, in the absence of any negotiated settlement, with the stipulations of the prevailing assignment of property rights), those individuals who are damaged by this lack of compliance will have to rely upon the judicial system to compel adherence to the established degree of control of the externality. However, litigation is costly in terms of both time and resources; and the outcome of virtually any judicial proceeding is uncertain. Consequently, inequities will arise if the adversely affected individuals decline to pursue litigation because of this cost and uncertainty; while abuses will occur if some individuals intentionally decline to adhere to the established degree of control of the externality in the belief that this behavior will not be challenged in court by the adversely affected individuals because of this cost and uncertainty.

Moreover, even if litigation is initiated, it is unlikely that the judicial system will produce an adjudicated settlement which unambiguously promotes the attainment of social optimality. To guarantee the provision of an adjudicated settlement of this type, the court must have access to accurate information specifying the incremental costs which will be incurred by each of the individuals who are affected by the externality as a result of any modification in the generation of the externality. However, the provision of reasonably accurate estimates of these costs will, in general, confront the same technical and motivational problems which arise in the provision of reasonably accurate estimates of the external costs attributable to the performance of any activity on any parcel of land which have been described in detail in Section 5.1.2. Consequently, the estimates of these costs which will be obtainable by the courts for any externality situation will necessarily be relatively crude; and, as a result, the settlement which is established by the courts in this situation is likely to cause some individuals to suffer decreases in personal welfare.

Indeed, the prospect that this result will prevail is intensified when relatively large numbers of individuals are involved in the externality situation because of the procedural rules which have been developed to determine any particular individual's eligibility to participate in legal proceedings concerning a particular externality situation. Although, conceivably, each adversely affected individual could bring suit against each individual who has failed to adhere to the established degree of control of the externality, a reduction in the cost of pursuing litigation can be obtained by allowing all adversely affected individuals to join together in initiating and maintaining this litigation. However, the prevailing rules of joinder may affect the ability of these individuals to adopt this strategy. Although the rules of joinder vary among states, the potential impact of these rules can be assessed to a reasonable extent by considering the Federal rule for joinder. This rule requires that the court must determine both that a common question of law or fact is involved for each individual who wishes to join in the litigation and that each of these prospective plaintiffs has a claim against each defendent, before these prospective plaintiffs can be permitted to join together in bringing suit.* Obviously, if the application of this rule excludes any adversely affected individuals from participation in the litigation, it is likely that the settlement attained in this litigation may be inequitable at least with respect to these excluded individuals.

Moreover, additional prospects for the attainment of inequitable adjudicated settlements arise when the number of individuals who are affected by an externality becomes so large that joinder becomes impractical. Under these circumstances, the legal mechanism for the attainment of an adjudicated settlement of an externality situation becomes the class action suit. A class action suit has been described as providing:

> "a means by which, where a large group of persons are interested in a matter, one or more may sue... as representatives of the class without needing to join every member of the class."**

However, as a practical matter, the procedural rules which have been established to control the initiation and maintenance of a class action suit may severely limit the ability of this legal mechanism to promote the attainment of social optimality. In particular, two recent decisions have severely restricted the ability of class action suits brought before Federal courts to establish unambiguously socially desirable controls over externalities. First, in Zahn v. International Paper Company,*** the court has ruled that, for an individual to be included within a class in a Federal class action suit, this individual must satisfy the Federal jurisdictional amount requirement.**** This requirement states that any entity which does not incur damages of more than $10,000 as a result of the generation of an externality cannot be included as a member of the class in a Federal class action suit concerning the control of the externality and, hence, must rely upon the state courts to adjudicate its grievances. Obviously, this interpretation of the Federal jurisdictional amount requirement introduces the possibility that the adjudicated settlements which are attained in Federal class action suits may be inequitable at least with respect to those individuals who are excluded from participation in these suits by the jurisdictional amount requirement. Second, in Eisen v. Carlisle and Jacquelin,[*] the Supreme Court has ruled that the plaintiffs representing a class in a Federal class action suit must, at their own expense, individually notify each and every member of the class whose name and address is known or can be ascertained. Clearly, this requirement will increase the cost of initiating any class action suit in the Federal courts and, hence, may discourage the initiation of suits whose adjudicated settlement would be socially desirable.

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*Federal Rule of Civil Procedure §20.

**Wright (118), p. 306.

***414 U.S. 291 (1973).

****28 U.S.C. §1332 (a).

Similar problems arise in the adjudication of class action suits in the state courts. Presently, there are three types of class action statutes which have been enacted by the states. One type is modeled after the current Federal class action rules,[**] which admits the possibility that state courts could also rule that individual notification of all class members is required. If this ruling is adopted by any state court, it is likely to preclude the initiation of some class action suits whose adjudicated settlement would be socially desirable. In addition, this type of class action statute provides that, in any class action suit, all potential members of a class will be bound by the court decision with respect to this suit unless they have "opted-out" of the litigation by notifying the court of their intention not to be a member of the class. This provision introduces the possibility that some individuals will be involuntarily constrainted by court decisions resulting from litigation of which they have been unaware and in which they would have had no desire to participate.

The second type of class action statute which has been enacted by some states is modeled after the old Federal class action rule, which differs dramatically from the present Federal class action rule to the extent that the old rule provides that, in any class action suit, no potential members of a class will be bound by the court decision with respect to the suit unless they have "opted-in" to the litigation. This provision admits the possibility that some individuals will be denied the benefits of an adjudicated settlement of an externality situation because they have been unaware of the proceedings which have produced this settlement.

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[*] 94 S. Ct. 2140 (1974).

[**] Federal Rule of Civil Procedure §23.

Finally, the third type of class action statute which has been adopted by some states is modeled after the New York Field Code,* which provides that, in any class action suit, all potential members of a class will be bound by the court decision with respect to the suit if the plaintiff represents the common interests of the class. This procedural rule permits the court to exercise substantial discretion about the extent of applicability of its decision with respect to a class action suit. However, in the absence of perfect knowledge on the part of the court, it is unlikely that the adjudicated settlements attained under this procedural rule will unambiguously promote the attainment of social welfare in all cases.

Nevertheless, all three types of class action statutes which have been enacted by the states do contain one common safeguard against inequities and abuses. In no case can a class action suit be concluded prior to the establishment of a court decision without the approval of the court. This restriction provides some protection against the possibility that the representatives of the class will make a deal with the defendants in the litigation which is detrimental to the interests of the remainder of the class.

5.4.4 Political Acceptability

The political acceptability of adopting publicly negotiated settlements among all individuals who are affected by any externality as a mechanism for the control of the externality is likely to be strongly influenced by the particular assignment of property rights in the generation of the externality which is established as a basis for these negotiations. An assignment of property rights which declares the emitters of the externality to be fully liable for the damages attributable to the externality will be supported by the recipients of the externality and opposed by the emitters of the externality; while an assignment of property rights which absolves the emitters of any liability for the damages attributable to the externality will be supported by the emitters of the externality and opposed by the recipients of the externality. Whether either of these extreme assignments of property rights, or any more moderate assignment of property rights, would actually be politically acceptable within any particular jurisdiction would necessarily depend upon the balance of political influence between these two groups in the jurisdiction.

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*See Ch. 438, §119 (1849), N.Y. Laws 72nd Sess. 639.

Moreover, to the extent that the attainment of a negotiated settlement in any externality situation will require the transfer of direct cash payments among different individuals who are affected by the externality and to the extent that the constituents of a political jurisdiction consider these direct cash payments to be socially undesirable bribes to induce modifications in the generation of the externality (i. e., either payments to pollute or extortions extracted under threat of pollution), publicly negotiated settlements among all individuals who are affected by externalities is likely to be politically unacceptable within the jurisdiction in the absence of the exertion of considerable public relations efforts by its proponents.

5.4.5 Expected Impacts on Land Use Patterns

The expected impact of publicly negotiated settlements among all individuals who are affected by externalities upon the pattern of development in an area will be strongly influenced by the particular assignment of property rights in the generation of externalities which is established in the area. If the assignment of property rights which is adopted in a region declares emitters of externalities to be completely free of any liability for the damages attributable to these externalities, the attainment of a negotiated settlement will require the recipients of these externalities to offer inducements to the emitters to restrict their generation of the externalities. Thus, under this assignment of property rights, to preclude a modification in the pattern of development in the region, it will be necessary for the existing residents of the region to negotiate settlements with potential developers of the region in which the existing residents induce the potential developers to refrain from initiating their proposed projects. However, given the large number of existing residents in any region who are likely to be affected by the externalities which will be generated by any large-scale project which is proposed, the negotiation of a settlement with the proposed developers of a large-scale project to forestall the initiation of the project will assume the properties of a public good for these existing residents. Therefore, under this assignment of property rights, negotiated settlements to forestall the development of large-scale projects will be achieved very infrequently; although negotiated settlements might be successful in precluding the development of some small-scale projects which generate externalities which adversely affect only a limited number of the existing residents of the region.

Conversely, if the assignment of property rights which is adopted in a region declares emitters of externalities to be fully liable for the damages attributable to these externalities, the attainment of a negotiated settlement will require the emitters to offer inducements to the recipients of the externalities to increase their absorption of the externalities. Thus, under this assignment of property rights, to produce a modification of the pattern of development in the region, it will be necessary for potential developers of the region to negotiate settlements with the existing residents of the region in which the potential developers induce the existing residents to accept the introduction of their proposed projects. However, given the large numbers of existing residents in any region who are likely to be affected by the externalities which will be generated by any large-scale project which is proposed, it is reasonably probable that a sufficiently large number of these existing residents will refuse to ratify any proposed settlement which is not sufficiently biased in their favor to preclude the negotiation of any settlement which permits the introduction of the proposed project. Therefore, under this assignment of property rights, negotiated settlements to permit the development of large-scale projects will be achieved very infrequently; although negotiated settlements might be successful in obtaining approval of the development of some small-scale projects which generate externalities which adversely affect only a limited number of the existing residents of the region.

Clearly, relative to the pattern of development which would have existed in the absence of any control of externalities, the assignment of full liability for the damages attributable to these externalities to the emitters of these externalities will have a much more limiting effect upon the pattern of development than will the assignment of no liability for these damages to these individuals. Nevertheless, to the extent that the negotiated settlements which are attained under any assignment of property rights cause potential developers to recognize external costs attributable to their proposed projects which they otherwise would have ignored, these settlements will inhibit the introduction of some projects which otherwise would have been undertaken. Yet, conversely, to the extent that these negotiated settlements also reduce the external costs which are incurred by those land uses which would have been adversely affected by the projects whose introduction has been inhibited, these negotiated settlements will encourage the expansion of these land uses. Consequently, the net impact of publicly negotiated settlements among all individuals who are affected by externalities upon the pattern of development and the aggregate rate of growth of any region is essentially an empirical issue which cannot be resolved purely on the basis of theoretical considerations.

5.5 Public Purchase of Scenic or Environmental Easements

Under a system of property rights which assigns to the owner of any parcel of land the right to use the parcel of land in any manner which he determines to be desirable, the unambiguous promotion of the attainment of social optimality through the control of any external effects which are attributable to an individual's use of his property requires that the property owner must be adequately compensated for any modifications of the permissible use of his property which are required for the implementation of this control. That is, the property owner must be paid compensation which is sufficient to guarantee that he attains a level of personal welfare when these external effects are controlled which is at least as great as the level of welfare which he would have achieved if control had not been exercised. In addition, to assure that no other member of society suffers a decrease in his personal welfare as a result of the control of these external effects, it also must be true that both the total benefits which are obtained by all of these other members of society as a result of this control equals or exceeds the total costs which are incurred by these individuals (including the compensation which they pay to the owner of the property whose use has been restricted) in implementing the control and the total benefit which is obtained by each of these other members of society as a result of this control is not less than the total cost which this individual incurs as a result of the implementation of the control.

Theoretically, all of these conditions can be fulfilled through the public purchase of scenic or environmental easements, under which the property owner surrenders the right to use his property in certain specified ways in exchange for a monetary payment from the government. However, numerous practical problems arise in attempting to implement a public policy of purchasing scenic and environmental easements which are likely to cause any actual purchase of a scenic or environmental easement to produce an allocation of resources which deviates from the socially optimal resource allocation.

5.5.1 Information Requirements and Information Retrieval Considerations

For the public purchase of any particular scenic or environmental easement to promote unambiguously the attainment of social optimality, it must be true that the cost which is incurred by the property owner from whom the easement is purchased, as a result of the establishment of the easement, does not exceed the net benefits which are obtained by all other members of society as a result of the establishment of the easement. Thus, conceptually, the cost incurred by this property owner and the net benefits obtained by all other members of society as a result of the establishment of the easement constitute the lower and upper bounds, respectively, of the range of compensation which could be paid for the easement while promoting the attainment of social optimality.

Unfortunately, the estimation of the value of either of these bounds is not easily performed. The net benefits obtained by all other members of society as a result of the establishment of the easement are equal to the discounted present value of the difference between the external costs which will be incurred by all of these individuals during each year in the future if the easement is not established and the external costs which they will incur during each of these years if the easement is purchased less the costs of negotiating the purchase of and enforcing the property owner's compliance with the easement. Although the negotiation and enforcement costs probably can be estimated reasonably accurately, the estimation of the discounted present value of the external costs which will be incurred with or without the easement constitutes an extremely difficult task. In particular, the technical and motivational problems in the estimation of the external costs attributable to the performance of any activity on any parcel of land which have been described in detail in Section 5.1.2 will arise once again in the determination of the appropriate compensation to pay for a scenic or environmental easement. Consequently, the estimates of external costs which are obtainable for even the current year will necessarily be relatively crude. Moreover, because any individual's estimate of his willingness to pay for the control of externalities becomes more speculative as the time period for which this estimate is provided lies further in the future, the estimates of external costs which will be obtainable for years in the increasingly distant future will undoubtedly be even less reliable than the estimates which are obtainable for the current year.

In addition, the discounting of these estimated future external costs requires the determination of the appropriate interest rate at which to perform this discounting. As explained in Section 5.3.2, this determination will require the forecasting of the average interest rate which will prevail in the market during each year in the future. The inevitable imperfection of these forecasts will introduce additional inaccuracies into the estimation of the net benefits which will be obtained by all members of society, except the property owner from whom this easement is purchased, as a result of the establishment of a scenic or environmental easement.

The estimation of the cost which is incurred by the property owner from whom the easement is purchased as a result of the establishment of the easement poses equally difficult problems. Theoretically, this cost is equal to the amount of wealth which must be given to this property owner to guarantee him the attainment of the same level of personal welfare when the easement is established that he would have obtained if the easement had not been established. Unfortunately, there exists no general method of objectively measuring this amount of wealth. If the property owner obtains the same satisfaction from his utilization of his property with the easement that he would have obtained without the easement, the amount of wealth which he must be paid to maintain his level of personal welfare at the level which he would have attained in the absence of the easement is equal to the difference between the market value of his property without the easement and the market value of his property with the easement. However, if the property owner suffers a decrease in the satisfaction which he obtains from using his property as a result of the establishment of the easement (i.e., if he is restricted from performing activities which he personally enjoys and, hence, suffers a decrease in the value which he personally attaches to the property) and if there exists absolutely no substitutes for this property, the amount of wealth which must be paid to this property owner is equal to the difference between the market value of his property without the easement and the market value of this property with the easement plus the difference between the value which he personally attaches to the property without the easement and his personal valuation of the property with the easement.

Finally, if the property owner suffers a decrease in his personal valuation of his property as a result of the establishment of the easement and if there exist reasonable substitutes for this property, the amount of wealth which must be paid to this property owner is equal to the difference between the market value of his property without the easement and the market value of this property with the easement plus the lesser of either the decrease in the property owner's personal valuation of his property or the minimum for all reasonable substitute properties of the sum of, first, the total costs which the property owner must incur in moving from his present property to each substitute property and, second, the difference between the market value of this substitute property and the market value of his present property without the easement and, third, the difference between his personal valuation of his present property without the easement and his personal valuation of the substitute property.

Since the imposition of a formal constraint upon a property owner's use of his own property cannot increase his personal valuation of this property (because he could have imposed this constraint upon himself informally if it would have increased the value which he personally attaches to the property) and since the property owner has freely chosen to own his present property, it is clear that the difference between the market value of the property without the easement and the market value of the property with the easement constitutes a lower bound on the cost incurred by the property owner as a result of the establishment of the easement. Consequently, in general, the estimation of the actual value of this cost will require knowledge of the property owner's personal valuation of his present property both with and without the easement, the market value of this property both with and without the easement, the property owner's personal valuations of all reasonable substitute properties, the market values of these substitute properties, and the costs of moving from the owner's present property to each of these substitute properties.

Reasonably accurate estimates of both the prevailing market values of properties and the costs of moving can usually be obtained from readily available data sources. However, the direct estimation of the market value which will prevail for a property to which an easement will be applied after this easement has been established may be severely constrained by society's lack of experience with the purchase of less than fee simple interests in land. Yet, to the extent that the constraints stipulated in easements are similar to the restrictions contained in municipal zoning ordinances, reasonable estimates of the effect of the establishment of an easement on the market value of property should be inferable from evidence of the effect of similar zoning restrictions upon the market values of similar properties. Therefore, initially, it will generally be desirable to conduct statistical studies of the relationship between zoning restrictions and the market values of the properties to which these restrictions are applied and, then, to utilize the results of these studies to estimate the expected effect of the establishment of easements on the market values of the properties to which these easements are applied.

Moreover, subsequently, as a community's experience with the establishment of easements expands, it will be desirable to develop data files which specify, for each property which is exchanged in the community, the market value which is established for the property in that exchange, the restrictions upon the use of the property which are stipulated in easements or other government regulations, the characteristics of the property and its neighborhood which can be expected to affect the property's market value, and the date on which the property has been exchanged. After a sufficiently large number of exchanges of property have been described in this manner in these data files, it should be possible to conduct statistical studies of the relationships among all of these variables which ultimately will permit the direct estimation of the value which any property can be expected to command in the market when any particular restrictive easement is applied to the property.

Finally, it is necessary to obtain acceptable estimates of the personal valuations which the owner of the property to which the easement will be applied attaches to various properties. Unfortunately, the provision of adequate estimates of these personal valuations generally requires detailed knowledge of the property owner's tastes and preferences -- knowledge which he normally will have no motivation to divulge accurately to the administrative agency responsible for purchasing scenic or environmental easements. Specifically, to the extent that his revelations of his personal valuations of various properties might influence the payment which he receives for an easement, it will be rational for him to overstate his personal valuation of his property without the easement and to understate both his personal valuation of the property with the easement and his personal valuations of all alternative properties. Consequently, the obtaining of reasonably accurate estimates of the property owner's personal valuations of properties may be impossible and, hence, the best obtainable estimate of the cost incurred as the result of the establishment of an easement by the owner of the property to which the easement is applied usually will be relatively crude.

5.5.2 Expected Deviations from Social Optimality

The analysis developed in Section 5.5.1 clearly demonstrates that, in general, it will be impossible to produce accurate estimates of either the upper bound or the lower bound of the range of compensation payments which could be made for an easement while unambiguously promoting the attainment of social optimality. Therefore, the possibility generally exists that the payment which actually is made for a scenic or environmental easement may fail to promote the attainment of social optimality. In particular, if the purchase of an easement results from completely voluntary negotiations, the compensation payment which actually is made may exceed the maximum payment which might conceivably promote the attainment of social optimality; while if the purchase of an easement is effected through an actual or threatened exercising of the power of eminent domain, the compensation payment which actually is made may either exceed this maximum payment or fall short of the minimum payment which might conceivably produce this result.*

Consequently, it is likely that, in some instances, the inaccurate measurement of the costs and benefits which are attributable to the establishment of scenic or environmental easements may precipitate either the purchasing of unambiguously socially undesirable easements or the failure to purchase potentially socially desirable easements. In particular, inaccuracies in the estimation of the values of the costs incurred by the owner of the property to which an easement is applied and the net benefits obtained by all other members of society as a result of the establishment of this easement may produce a determination that the net benefits attributable to the establishment of the easement exceed the costs attributable to its creation when, in fact, the costs exceed the net benefits. Errors in measurement of this type will precipitate the purchasing of scenic or environmental easements whose establishment necessarily is socially undesirable because, regardless of the amount of compensation paid to the owners of the properties to which the easements are applied, some member or members of society inevitably will suffer decreases in personal welfare as a result of the establishment of the easement. Similarly, inaccuracies in the estimation of costs and benefits may, in some instances, produce a conclusion that the costs attributable to the establishment of an easement exceed the net benefits attributable to its creation when, in fact, the opposite is true. Errors of measurement of this type will cause a failure to purchase easements, whose establishment is potentially socially desirable and, hence, will cause all members of society to experience lower levels of personal welfare than they simultaneously could have experienced if the easements had been established appropriately.

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*The compensation payment which actually is made when the purchase of an easement is freely negotiated will never be less than the minimum payment which might conceivably promote the attainment of social optimality because a payment which is less than this minimum will cause the owner of the property to which the easement will be applied to suffer a decrease in his personal welfare and, hence, will be rejected by this property owner.

Admittedly, socially undesirable consequences of both of these types are reversible to the extent that any undesirable easements which have been established can be sold back to the owners of the properties to which they have been applied and any desirable easements which have not been established can be purchased belatedly by the government. However, society will suffer irrecoverable losses of aggregate welfare throughout the time period during which these errors are not recognized and corrected. Moreover, the possibility also exists that any delay in the purchase of a potentially socially desirable easement will permit the development of a use on the property to which the easement will apply whose initiation and discontinuation will require the incurring of costs which could have been avoided completely if the delay had not occurred.

In addition, in those situations in which the establishment of a scenic or environmental easement is potentially socially desirable, inaccuracies in the estimation of the costs and benefits attributable to the establishment of these easements may cause the compensation payments which are made to the owners of the properties to which the easements are applied to be either inappropriately large or inappropriately small and, hence, may cause the establishment of these potentially socially desirable easements to incorporate socially undesirable distributional effects. Specifically, if the compensation which actually is paid for the establishment of a potentially socially desirable easement exceeds the maximum payment which might conceivably promote the attainment of social optimality, some member or members of society other than the owner of the property to which the easement is applied will suffer decreases in personal welfare as a result of the purchase of the easement. Conversely, if the actual compensation payment for a potentially socially desirable easement is less than the minimum payment which might promote the attainment of social optimality, the owner of the property to which the easement is applied will suffer a decrease in his personal welfare as a result of the establishment of the easement. Neither of these effects if socially desirable so long as individual preferences are weighted positively in the social welfare function.

Finally, even if the easement which is established in a particular externality situation is potentially socially desirable and the compensation payment which is made for the easement is appropriate in the aggregate, socially undesirable distributional effects might be produced by the mechanism which is employed to finance the compensation payment. For the purchase of an easement to promote unambiguously the attainment of social optimality, the funds which are employed to finance its purchase must be obtained from a revenue source which imposes upon each member of society other than the owner of the property to which the easement is applied a tax whose total value does not exceed the net benefit which this member of society will obtain as a result of the establishment of the easement. However, the difficulty of obtaining any reasonably accurate estimates of this net benefit has been described in detail previously in this section and has led directly to the conclusion that any estimate of this net benefit which, in practice, can be produced will necessarily be relatively crude. Consequently, it will virtually inevitably be impossible to guarantee that the tax mechanism which is employed to finance the purchase of any scenic or environmental easement will unambiguously promote the attainment of social optimality. Rather, in general, it is likely that this tax mechanism will cause some members of society to suffer decreases in personal welfare as a result of the purchase of the easement.

The analysis of scenic or environmental easements which has been developed up to this point has implicitly assumed that the restrictions which are specified in these easements have already been determined. However, obviously, the extent to which any particular scenic or environmental easement promotes the attainment of social optimality will be strongly influenced by the nature of the restrictions upon development which are specified in the easement. To promote unambiguously the attainment of the socially optimal allocation of resources, an easement must restrict the generation of any particular adverse external effect to that level at which, first, the incremental cost which is imposed upon society by the last unit of the externality which is actually generated is equal to the incremental benefit which is obtained by society as a result of the generation of this unit of the externality and, second, for any increase in the generation of the external effect, the incremental cost incurred by society exceeds the incremental benefit obtained by society. To determine the level of generation of the externality which will fulfill these conditions, it is necessary to estimate both the cost which the establishment of the easement will impose upon the owner of the property to which the easement will be applied for each level of restriction of the generation of the externality which might be specified in the easement and the net benefits which the establishment of the easement will provide to all other members of society for each of these levels of restriction. However, any attempt to obtain reasonably accurate estimates of these costs and benefits for any particular level of restriction of the generation of the externality will confront all of the theoretical and empirical problems which have been described in detail in Sections 5.1.2 and 5.5.1. Consequently, the estimates of the incremental costs and incremental benefits of restricting the generation of the externality which, in practice, are obtainable will necessarily be somewhat inaccurate. Therefore, it will almost inevitably be true that the restrictions specified in any scenic or environmental easement which actually is established will deviate to some extent from those restrictions whose inclusion in the easement would unambiguously promote the attainment of social optimality. Thus, the easements which actually are established will almost invariably provide a level and pattern of externality generation which is socially suboptimal.

Moreover, even if the socially optimal level of externality generation can be unambiguously identified, the establishment of an easement will not be capable of guaranteeing the attainment of this level of externality generation unless the conditions which must be fulfilled to assure its attainment can be stipulated in a manner such that compliance with these stipulated conditions by the activity performed on the property to which the easement is applied can be monitored in a technically reliable and economically feasible manner. Thus, if it is impossible to monitor the generation of the externality directly and if the activities performed on the property which can be monitored effectively are not appropriately functionally related to the generation of the externality, it will be impossible to guarantee the attainment of the socially optimal level of externality generation through the establishment of a scenic or environmental easement.

Finally, the establishment of a scenic or environmental easement will, in many instances, be incapable of promoting the attainment of social optimality because easements are essentially negative control mechanisms. A scenic or environmental easement, at best, delineates the maximum permissible level of externality generation which can be performed on a parcel of land. However, it provides no direct incentive to the owner of the property to generate a smaller quantity of the externality if this change in externality generation is or becomes socially desirable. Thus, for example, although a change in technology which reduces the cost of controlling the generation of an externality may cause a decrease in the generation of the externality to become socially desirable, scenic or environmental easements contain no mechanisms which will automatically permit the owners of the properties to which the easements are applied to acquire some portion of the decrease in external costs which will be obtained by the remainder of society if the technological change is introduced. Therefore, these easements provide no motivation to these property owners to adopt this socially desirable technology. Rather, if the technology is to be introduced, the government must, first, become aware of its availability and potential social desirability and, then, must negotiate restrictive modifications of the existing easements to provide for the introduction of the technology.

5.5.3 Potential Inequities, Abuses, and Enforcement Problems

Since both the decision to establish a scenic or environmental easement on any property and the magnitude of the payment which is made to the owner of the property to compensate him for the establishment of the easement are directly related to the magnitude of the external costs which will be imposed upon society by the activity which will be performed on the property in the absence of the easement, a property owner can increase the return which he obtains from his property by displaying a convincing interest in initiating activities upon the property which will impose substantial external costs upon other members of society when he has no actual interest in initiating these activities. If, in this manner, a property owner successfully induces the government to purchase an easement on his property which prohibits the pursuit of an activity which the property owner would not have chosen to initiate under the prevailing and foreseeable economic conditions in the absence of the easement, an unnecessary expenditure of public funds and, hence, a socially undesirable transfer of income from the remainder of society to the property owner will have been performed. Yet, the motivation clearly exists for property owners to adopt strategies which might produce these results. Therefore, to protect society from this form of bribery, any agency responsible for the purchase of scenic or environmental easements should attempt to forecast throughout the foreseeable future the expected use of each property to which the application of an easement is being considered. Nevertheless, unless this forecasting process is perfect, the possibility will exist that the agency both might be induced to purchase some socially undesirable easements and might mistakenly choose not to purchase some socially desirable easements.

In addition, since, in many instances, the purchase of a socially undesirable easement will provide an increase in wealth to the property owner from whom the easement is purchased, motivations will exist for this property owner to offer some portion of this increase in wealth to the public official who is responsible for deciding whether to purchase an easement on his property to induce this official to purchase the easement. To the extent that this bribery is successful, the public purchase of scenic or environmental easements will cause some member of members of society, other than the property owners from whom socially undesirable easements are purchased and the public officials who have accepted bribes, to suffer decreases in personal welfare as a result of the establishment of these socially undesirable easements.

Moreover, additional inequities are likely to result from the public purchase of scenic or environmental easements if an exercising of the power of eminent domain is either performed or threatened to compel or induce the sale of an easement by any property owner. The legal concept of "just compensation," which determines the payment which will be made to the property owner from whom an easement is purchased in any eminent domain proceeding, employs as its basic appraisal standard the value for which a property might be expected to be exchanged in the market. Therefore, if accurate estimates can be obtained of the market value of the property to which the easement will be applied both with and without the easement, the "just compensation" which will be paid to the owner of this property for the establishment of the easement will be equal to the difference between the market value of the property without the easement and the market value of the property with the easement. However, as has been demonstrated in Section 5.5.1, this difference represents merely the lower bound on the amount of compensation which must be paid to the property owner to guarantee that he will not suffer a decrease in his personal welfare as a result of the establishment of the easement.

Consequently, in general, the payment of legal "just compensation" to the owner of any property to which an easement is applied will cause the property owner to suffer a decrease in his personal welfare as a result of the establishment of the easement. In fact, even if a property owner accepts a payment in excess of the legal "just compensation" in exchange for the establishment of an easement on his property, this property owner may suffer a decrease in his personal welfare as a result of the establishment of the easement if the administrative agency which is responsible for purchasing scenic or environmental easements has warned him that the power of eminent domain will be exercised to compel the establishment of an easement on his property if he refuses to accept a negotiated settlement. In this situation, it will be rational for the property owner to accept any compensation which is offered which exceeds the difference between the legal "just compensation" which he expects to receive if the easement is established as a result of formal eminent domain proceedings and the costs which he will incur if he participates in these formal proceedings -- even if the compensation which is offered by the administrative agency is inadequate to protect him against a decrease in his personal welfare.

Finally, inequities in the treatment of different property owners can be produced by the inconsistent monitoring of the activities which are performed upon the various properties to which easements are applied. If these easements impose binding constraints upon the use of the properties in the sense that they prohibit the owners of the properties from pursuing activities on their properties which they would have performed in the absence of the easements, motivations will exist for these property owners to increase the return which they obtain from their property by violating the conditions specified in the easements. Consequently, it will be necessary for the agency which is responsible for the administration of the easements to monitor the compliance of the activities performed on the properties to which the easements are applied with the conditions specified in the easements. However, unless this agency monitors the activities which are performed on each of these properties on a continuous basis, it is likely that inequities will arise between property owners whose violations of the conditions of their easements are not detected until a substantial period of time has elapsed after the initiation of these violations, and property owners who conscientiously adhere to the conditions specified in their easements. Moreover, since the violation of the conditions specified in any easement will provide an increase in wealth to the owner of the property to which the easement is applied, motivations will exist for the property owner to offer some portion of this increase in wealth to the public official who is responsible for monitoring the compliance of the activities performed on his property with the conditions specified in the easement. Therefore, it is conceivable that, in some situations, the inequities associated with inconsistent monitoring will constitute intentional abuses of the public policy of establishing scenic and environmental easements rather than merely random aberrations of this policy.

5.5.4 Legal Constraints and Political Acceptability

If the establishment of a scenic or environmental easement involves an exercising of the power of eminent domain, two legal conditions must be fulfilled. First, the owner of the property to which the easement is applied must be paid "just compensation" for the damage which he suffers as a result of the establishment of the easement. Thus, it is unconsitutional for any public agency to establish an easement on any property without paying the owner of the property compensation which is at least equal to the difference between the market value of the property without the easement and the market value of the property with the easement. Second, the constraints which are imposed upon the use of the property to which the easement is applied must serve a public purpose. Therefore, any administrative agency which attempts to establish a scenic or environmental easement through an exercise of the power of eminent domain must be prepared to demonstrate to the satisfaction of the court the benefits which will accrue to society as a result of the establishment of the easement.

Yet, those political jurisdictions which have already experimented with the public purchase of scenic and environmental easements have not encountered any substantial difficulties in the establishment of easements as a result of these legal requirements.* To the extent that these favorable experiences are generally known, they should enhance the political acceptability of the public purchase of scenic or environmental easements in other political jurisdictions. Moreover, to the extent that the purchase of scenic or environmental easements is considered to be similar to other public purchases of real property (e.g., the condemnation of fee simple interest in land under the power of eminent domain) by the constituents of a political jurisdiction, the political acceptability of the public purchase of these easements should be further improved. However, to the extent that these constituents consider the use of public funds to purchase scenic or environmental easements to be a lower priority use of these funds than the financing of the provision of other public services, the public purchase of easements may be less acceptable politically than externality control policies which do not require the payment of public funds to private individuals.

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*See, for example, Penn (83).

5.5.5 Expected Impact on Land Use Patterns

To the extent that the establishment of scenic or environmental easements will preclude the development of activities which otherwise would have been introduced on the properties to which the easements are applied, growth will be restricted by the establishment of the easements. Conversely, to the extent that the decreases in external costs which are attributable to modifications in the activities which are performed upon the properties to which scenic or environmental easements are applied induce an expansion of the development of other properties in the region in which the easements have been established, growth will be encouraged by the establishment of easements. Thus, clearly, the public purchase of scenic or environmental easements can be expected to alter the pattern of development in the region in which the easements are established. However, the effect of the establishment of the easements upon the growth of this region in the aggregate invariably constitutes an empirical issue which cannot be definitively resolved solely on the basis of theoretical analysis.

The impact of the public purchase of scenic or environmental easements upon the stability of land use will be determined by the extent to which the restrictions specified in the easements preclude the pursuit of activities which actually would have been performed in the absence of the easements. However, unless the easements which are established require the discontinuation of activities which are already being performed on the properties to which these easements are applied, the directly observable effects of the establishment of scenic or environmental easements upon the stability of land use will be negligible.

5.6 Landowner Development Corporations

The attainment of the socially optimal allocation of resources is severely threatened by the existence of externalities because the individual resource owners whose activities generate these externalities have no direct motivation to recognize or, more importantly, to incorporate into their decision-making processes the external costs which these activities impose upon other members of society. However, theoretically, these problems of unreconciled interdependencies among economic activities can be resolved through the merger of all of the individuals who are affected by any externality into a single decision-making unit which has the authority to determine the allocation of all resources which affect the generation of the externality. Since this decision-making unit will obtain all of the gains associated with the provision of a more socially desirable allocation of resources and will incur all of the costs associated with the provision of a less socially desirable allocation of resources in this externality situation, it will be motivated to incorporate all of the costs and benefits attributable to its activities into its resource allocation decisions and, hence, to provide an allocation of resources which unambiguously promotes the attainment of social optimality.

The formation of a landowner development corporation constitutes an attempt to apply this merger strategy to the control of those externalities which are generated by the activities performed on land. Conceptually, by unifying within a single decision-making unit the authority to control the use of all of the parcels of land which might potentially be involved in a particular externality situation, a corporation of this type can be expected to incorporate appropriately into its decision-making those interdependencies among land use activities which cause the unrestricted market to produce an economically inefficient and, hence, socially suboptimal pattern of land use. Specifically, since the restriction of activities which generate external costs and the expansion of activities which provide external benefits will increase the values which the users and potential users of externally affected parcels of land attach to these properties and since competition among these individuals will translate these increased personal valuations of these properties into increased market values for these properties, the appropriate control of externalities by this corporation will produce total returns to all of the properties involved in the externality situation which exceed the total returns which these properties would have earned in the absence of the control of these externalities. If these additional total returns exceed the total cost of establishing and administering the landowner development corporation, this corporation simultaneously can both unambiguously promote the attainment of social optimality and provide an incentive for each of the individuals who are affected by the externalities to become shareholders in the corporation (i.e., transfer control of the utilization of the properties involved in the externality situation to the corporation in exchange for shares in the corporation) by distributing the additional net returns earned by these properties as a result of the corporation's control of externalities (i.e., the additional total returns earned by these properties in excess of the costs of administering the corporation) among these individuals in a manner which guarantees that none of the individuals experiences a lower level of personal welfare when the corporation controls the generation of externalities than he would have obtained in the absence of this control.

However, it is important to recognize that, to achieve this unambiguously socially desirable result, the landowner development corporation must perceive and appropriately incorporate into its decision-making processes the costs and benefits which its decisions will generate for all of the individuals who are involved in the externality situation. Thus, to control effectively all of the externalities which arise from the use of land, this corporation not only must promote the personal welfare of all owners of developable property within the geographic area in which the externalities arise, but also must protect or advance the interests of all other property owners and other individuals whose personal welfare is affected by the generation of the externalities. The most direct method to assure that these conditions are fulfilled is to include all of these individuals as shareholders in the corporation. Only if each individual who incurs costs or obtains benefits in the externality situation is included as a shareholder in the corporation is there any automatic assurance that the personal welfare of all of these individuals will be considered in the corporation's decision-making.

5.6.1 Information Requirements and Expected Deviations from Social Optimality

If all of the individuals who are involved in the externality situation are included as shareholders in the corporation, the appropriate control of the externalities which are attributable to the use of land within the geographic area administered by the corporation can be performed in a reasonably straightforward manner if the sole objective of each of these shareholders is the maximization of the financial return on his investment in the corporation. In this case, the objective of the landowner development corporation is simply the maximization of the total financial return earned by the property whose utilization it controls. The information required to perform this maximization consists of merely the reasonably predictable rental values which the properties administered by the corporation will command in the market when each of the various land use patterns which might be developed by the corporation actually prevails, the cost of providing the private facilities required to achieve each of these patterns of development, and the cost of providing public facilities to serve each of these various land use patterns (which the corporation will recognize and incorporate into its decision-making processes because the corporation pays all of the property taxes which finance the provision of these facilities). Although the practical difficulties associated with assembling and assimilating this information in producing land use decisions undoubtedly will be considerable, they should be no greater, and probably will be less, than the problems which would confront any public agency which might attempt to regulate the uncoordinated use of these properties by all of the individuals who are involved in the externality situation.

However, the complexity of determining the socially optimal allocation of activities to parcels of land increases substantially in the more common case where some of the individuals who are involved in the externality situation are interested in maximizing the satisfaction which they obtain from the use of land rather than just the financial return which they earn on their investment in land. Under these circumstances, the appropriate control of the externalities arising from the use of land requires not only information concerning the market values of parcels of land when different patterns of development prevail, the cost of providing the private facilities required for these patterns of development, and the cost of providing public facilities to serve these patterns of development; but also information concerning the personal valuations which the various individuals who are involved in the externality situation attach to these different development patterns.

Whenever this information concerning personal valuations is required, the landowner development corporation can adopt either of two basic strategies to elicit this information for inclusion into its decision-making processes. First, the corporation can develop a decentralized decision-making structure which relies upon the attainment of negotiated settlements among its shareholders to determine the socially optimal pattern of development. However, any attempt to achieve an unambiguously socially desirable privately negotiated settlement among all of these shareholders will encounter precisely the same technical and motivational difficulties which the analysis in Section 5.4 has demonstrated will impede the attainment of unambiguously socially desirable publicly negotiated settlements among all of the individuals who are affected by any particular externalities. Alternatively, the corporation can develop a centralized decision-making structure which relies upon estimates of these personal valuations of patterns of development as informational inputs into its determination of the socially optimal pattern of development. However, any attempt to obtain reasonably accurate estimates of these personal valuations will encounter precisely the same technical and motivational difficulties which the analysis in Section 5.5.2 has demonstrated will inhibit the generation of reasonably accurate estimates of personal valuations in the context of the public purchase of scenic or environmental easements. Consequently, under either of these decision-making strategies, it is extremely unlikely that the landowner development corporation will be successful in identifying the socially optimal pattern of development.

Moreover, recognizing the large number of individuals who are affected by many of the externalities which are attributable to the development and use of land, it will frequently be impossible to enlist all of these individuals as shareholders in a landowner development corporation. Rather, it appears more likely that, at best, this corporation will successfully attract as shareholders only those individuals who own property or reside within the geographic area in which the externalities are generated; and that, more frequently, it will succeed in enlisting as shareholders only those individuals who own developable property within this area.

Whenever a landowner development corporation fails to include as shareholders all of the individuals who are involved in any externality situation, the attainment of social optimality in this situation requires that the corporation, in making its decision, must recognize and appropriately account for all external costs and benefits which its actions impose upon individuals who are not shareholders in the corporation. However, since the shareholders of the corporation will absorb all of the costs and obtain none of the benefits associated with incorporating these external costs and benefits into the corporation's decision-making processes, these shareholders will have no direct motivation to encourage the corporation to consider these external costs and benefits in its decision-making. Therefore, unless the corporation behaves in a manner which is inconsistent with the advancement of the interests of its shareholders, the pattern of development which is established by the corporation when it fails to include as shareholders all individuals who are involved in the externality situation can be expected to deviate to some extent from the socially optimal pattern of development.

5.6.2 Potential Inequities, Abuses, and Enforcement Problems

If a landowner development corporation does not include as shareholders all of the individuals who are affected by the externalities which the corporation is attempting to control, the actions taken by the corporation can, in general, be expected to provide increases in personal welfare for its shareholders and to impose decreases in personal welfare upon (or, at least, to fail to provide attainable increases in personal welfare to) those individuals who are involved in the externality situation but are not shareholders in the corporation. Moreover, unless the corporation initiates actions only on the basis of mutually agreeable negotiated settlements among all of its shareholders, the actions taken by the corporation can be expected to provide increases in personal welfare to some of its shareholders and to impose decreases in personal welfare to other shareholders in many instances. Thus, if the corporation relies upon either a decentralized decision-making process which requires less than the unanimous approval of all shareholders as authorization for the initiation of any action or a centralized decision-making process which bases its decisions upon unavoidably inaccurate estimates of the personal valuations of its shareholders, some inequities can be expected to be observed in the differential impacts which its actions have upon the personal welfare of its various shareholders. In addition, since the actions taken by the corporation (especially the distribution of the additional net returns which are earned, as a result of the corporation's control of externalities, by the properties whose utilization is controlled by the corporation) directly affect the wealth of the shareholders of the corporation, motivations will exist for individual shareholders to offer bribes to the administrators of the corporation to induce these administrators to initiate actions which will increase their personal wealth -- regardless of the effect of these actions upon other shareholders or other individuals who are involved in the externality situation. Obviously, if bribes of this type are accepted and acted upon by the administrators of the corporation, systematic, intentional inequities will be established both among the shareholders of the corporation and among all of the individuals who are involved in the externality situation.

Finally, and more importantly, it must be recognized that the same consolidation of control which provides to a landowner development corporation the power to internalize the externalities which arise among the various land use activities within a geographic area also provides to this corporation the power to exercise monopoly control over the development of land in this area. Thus, in the absence of any public regulation of its actions, a landowner development corporation will be motivated to increase the net return which will be earned by the property which it controls by taking advantage of the less than perfect elasticity of the total market demand for this property. At the extreme, if the corporation is capable of practicing perfect price discrimination against all users of the property (i.e., if it is able to identify and extract from each of these individuals the maximum amount of income which this individual is willing to pay for the use of the property), the corporation will continue to provide the same economically efficient pattern of development which it would have provided if it had not attempted to exercise its monopoly power to any extent, but it also will produce a substantial redistribution of wealth from the users of its property to the shareholders of the corporation. However, to exercise perfect price discrimination, the corporation must acquire perfect knowledge of the personal valuations which the various potential users of the property attach to the different patterns of development which might be established on the property. Yet, to the extent that these potential users realize that their revelations of their personal valuations of these various patterns of development will directly affect the amount of income which the corporation will require them to surrender to obtain the right to use the corporation's property, these potential users will rationally understate their personal valuations of these patterns of development. Consequently, it will inevitably be true, in practice, that the landowner development corporation will be unable to obtain sufficiently accurate estimates of the personal valuations of the potential users of its property to be able to practice perfect price discrimination against these individuals.

Therefore, in general, the landowner development corporation will discover that, to maximize the net return which can be earned by its property in practice, it will be necessary to induce the users of the property to make larger payments for the right to use the property by restricting the development of the property below the level of development which would have been undertaken in the absence of any exercise of monopoly power. In particular, it will be possible to increase the total net return which can be earned by the property be restricting its development in a manner which will increase the return earned by the portion of the property which the corporation continues to develop more than it decreases the return earned by the portion of the property which the corporation chooses not to develop. However, any restriction of development of this type will be economically inefficient in the sense that, relative to this restricted level of development, there will exist some expansions of development for which some potential users of the corporation's property would be willing to pay an amount of income in excess of the cost which society must incur in performing the expansion of development. Thus, in general, the exercise of monopoly power by a landowner development corporation will precipitate the socially undesirable exclusion of some potential users from access to the property controlled by the corporation and, hence, will fail to promote unambiguously the attainment of social optimality.*

To forestall this outcome, public regulation of the potentially monopolistic behavior of the corporation will be required. For this regulation to promote unambiguously the attainment of social optimality, the public agency which is responsible for the administration of the regulation must assemble and analyze sufficient information to identify those instances in which the behavior of the landowner development corporation is inconsistent with the attainment of the socially optimal pattern of development of the property controlled by the corporation. In general, this information will consist of essentially the same information which would be required to develop a mechanism to control the generation of externalities among the activities performed upon the property directly. Consequently, there is no clear advantage associated with the public sector's permitting the formation of and, then, regulating the behavior of a landowner development corporation in any externality situation, instead of controlling the generation of externalities directly in this situation. Rather, the relative social desirability of these alternative public policies must be determined empirically by balancing the comparative success of these policies in promoting the development of socially desirable land use patterns against the comparative levels of total cost which must be incurred in administering these policies.

5.6.3 Legal Constraints and Political Acceptability

The primary legal barrier confronting the formation of landowner development corporations consists of the antitrust and antimonopoly statutes of the Federal government and the various state governments. If the courts' interpretations of these statutes consider the merger within a single decision-making unit of the authority to control the utilization of all property within a particular geographic area to constitute the formation of an illegal combination in restraint of trade, the feasibility of establishing landowner development corporations obviously will be severely challenged.

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*These inequities will not arise if all individuals who might be affected by the use of land within any geographic area -- including potential residents and other potential users of land in the area -- are included as shareholders in a landowner development corporation which requires the mutual agreement of all shareholders as authorization for the adoption of any decision which restricts development. Under these circumstances, any individual who might be damaged by any exercising of monopoly power will be able to forestall this exercising of monopoly power. However, in practice, it appears to be extremely unlikely that any landowner development corporation could either successfully enlist all of these individuals as shareholders or establish a productive decision-making process which contains such stringent safeguards.

Moreover, even if these legal barriers either prove to be illusory or can be overcome, the formation of a landowner development corporation must be politically acceptable to the constituents of the political jurisdiction in which its establishment is proposed before this jurisdiction will permit its establishment. To the extent that these individuals consider a landowner development corporation to constitute a unique and unprecedented mechanism for the control of externalities, its political acceptance by these constituents will require the exertion of substantial public relations efforts by its proponents.

In addition, to the extent that the formation of a corporation of this type can be expected to provide net benefits to some of these constituents and to impose net costs upon other constituents, the overall political acceptability of this control mechanism will be determined to some extent by the relative political influence of those constituents who will obtain net benefits from its adoption and those constituents who will incur net costs as a result of its adoption. Thus, for example, if it is perceived that the formation of a landowner development corporation which includes as shareholders only the owners of property within a particular political jurisdiction might exercise its control over the development of property within the jurisdiction solely to the advantage of its shareholders and, hence, to the disadvantage of the renters of property within the jurisdiction, the overall political acceptability of the formation of the corporation will be strongly influenced by the relative political influence of the property owners and renters in the political jurisdiction. Clearly, under these circumstances it is impossible to derive any general conclusions about the potential political acceptability of landowner development corporations in all political jurisdictions.

5.6.4 Expected Impacts on Land Use Patterns

To the extent that the actions taken by a landowner development corporation reduce both the external costs which are generated by the activities which are performed upon the property whose utilization it controls and the cost of providing public facilities to serve the property, these actions should encourage an expansion of development undertaken on the property. Conversely, to the extent that the corporation exercises its monopoly power to increase the net return earned by the property which it controls, the actions taken by the corporation will restrict development on the property. Consequently, the expected impact of the formation of a landowner development corporation in any particular area upon the overall rate of growth of the area constitutes an empirical issue which cannot be resolved solely on the basis of theoretical analysis. Nevertheless, it can be asserted that the more effective is the government's regulation of the monopolistic tendencies of any landowner development corporation, the greater will be the tendency of the landowner development corporation to take actions which will encourage the overall growth of the area in which it operates.

In addition to affecting the overall level of development within a geographic area, the formation of a landowner development corporation can be expected to influence the pattern of development in the area. In particular, the actions taken by any corporation of this type can be expected to avoid the development of mixtures of land use activities which impose substantial external costs upon its shareholders and to expand the development of mixtures of land use activities which provide substantial external benefits for these shareholders. Similarly, the corporation can be expected to develop land use patterns which economize on the cost of providing public facilities to serve the activities incorporated within these patterns. Nevertheless, since the landowner development corporation's primary objective is the maximization of the net return earned by the property whose utilization it controls, it appears unlikely that these modifications of the pattern of development will be abrupt or destabilizing. Rather, the corporation can be expected to perform these modifications in a coordinated manner calculated to preserve and enhance these net returns.

5.7 Required Payment by New Developments of Full Additional Cost of all Public Facilities

If each property owner who develops his property is required to pay the full additional cost of all expansions of public facilities which must be provided to serve this development, a property owner will choose to develop his property only if the total return which he expects to obtain from this development exceeds the private cost which he incurs in performing the development by more than this full additional cost. Conversely, he will choose to forego this development if this total return exceeds his private development cost by less than this amount. Thus, if either there exist no externalities between private land uses or those externalities which do exist between private land uses have been optimally controlled by other public or private actions, a policy which requires the owners of new developments to pay the full additional cost of all expansions of public facilities which must be provided to serve these developments should induce property owners to introduce all land use activities which will generate total returns in excess of the total private and public costs of developing these activities, and should discourage property owners from initiating any land use activities which will generate total returns less than these total private and public costs. Hence, if this requirement can be effectively implemented, this policy should unambiguously promote the attainment of the socially optimal pattern of development.

5.7.1 Information Requirements

Unfortunately, the effective implementation of the requirement that the owner of any new development must pay the full additional cost of all expansions of public facilities which must be provided to serve this development is severely hampered by the empirical difficulties associated with the estimation of this full additional cost. This estimation would cause no problems if all public facilities could be expanded in arbitrarily small increments such that the cost of providing each incremental unit of any particular public facility is constant and each incremental unit of each public facility provides services to only one development. If these conditions were fulfilled, the attainment of the socially optimal pattern of development could be unambiguously promoted by merely determining the cost of providing an incremental unit of each public facility and, then requiring property owners to pay a price equal to this cost for each unit of the public facility which is provided to serve their developments.

However, these conditions generally are not fulfilled for public facilities. Rather, the expansions of public facilities which must be provided to serve particular new developments frequently are characterized by indivisibilities in supply and jointness in consumption which cause the provision of these additional public facilities to exhibit increasing returns to scale. Although it is impractical to attempt to enumerate all of the problems which can be expected to arise in the estimation of the full additional cost of expanding each public facility which is provided to serve each new development in any realistic situation in which increasing returns to scale prevail, a reasonable appreciation of the magnitude of these difficulties can be obtained from the consideration of a simplified example.

Therefore, consider the problem of providing sewerage to serve all of the land use activities which are developed within a particular geographic area. Assume initially that all of these land use activities are initiated simultaneously and that the topographic characteristics of the geographic area preclude the extension beyond this area of the sewerage system which is installed to serve the developments within the area. Although it probably would be technically feasible to install a separate sewer line connecting each of these developments to the regional sewage treatment facility, it almost invariably will be possible to attain a lower level of total cost in providing this same level of total sewerage service to the geographic area by installing a unified system consisting of a single trunk sewer line with sufficient capacity to transport all of the sewage generated by all of the developments in the area to the regional sewage treatment facility and a set of smaller individual sewer lines which connect each of these developments to the trunk sewer line.

However, unfortunately, this unified sewerage configuration introduces substantial complexity into the measurement of the full additional cost of providing sewerage service to each of these developments. Clearly, the cost of installing the individual sewer line which connects any of these developments to the trunk sewer line constitutes a component of the full additional cost of providing sewerage service to this development; and, hence, this cost component constitutes a lower bound upon the charge which must be imposed upon the owner of this development in attempting to recover the full additional cost of providing the development's sewerage service.

Yet, the provision of sewerage service to this development also involves the installation of the trunk sewer line which serves all of the developments in the geographic area; and the cost of installing the trunk sewer line constitutes a component of the full additional cost of providing sewerage service to all of these developments. Unfortunately, the cost of installing the trunk sewer line is a joint cost of all of the developments which generally cannot be systematically allocated among the developments in a manner which will unambiguously promote the attainment of social optimality purely on the basis of the physical or technological characteristics of the sewerage system. Rather, to promote the attainment of social optimality, the cost of installing the trunk sewer line must be allocated among the individual developments which it serves in a manner which guarantees that the portion of this cost which is allocated to each of the developments does not exceed the value of the total benefit which the owner of the development obtains from the provision of the trunk sewer line (i.e., the difference between the value of the total benefit which the property owner obtains from the provision of its complete sewerage service and the cost of installing the individual sewer line which connects his development to the trunk sewer line).*

For a property owner whose sole objective is the maximization of the profit which he earns on his investments, the value of the total benefit which he obtains from the provision of this sewerage service to his development is equal to the difference between the financial return which he would earn from this development if the sewerage service were provided free of charge and the financial return which he would earn from his best alternative investment opportunity. Similarly, for a property owner whose objective is the maximization of his satisfaction (e.g., the owner-occupant of a residential property), the value of this total benefit is equal to the difference between the consumer's surplus which he would obtain from his development if the sewerage system were provided free of charge and the consumer's surplus which he would obtain from his best alternative market opportunity. Consequently, the determination of the upper bound on the portion of the total cost of installing the complete sewerage system which can be imposed upon the owner of each development which will be served by the sewerage system while unambiguously promoting the attainment of social optimality requires either the estimation of the revenues which will be obtained and the costs which will be incurred by this property owner from both this development and his best alternative investment opportunity if his sole objective is the maximization of his profit or the estimation of the personal value which will be obtained and the costs which will be incurred by this property owner from both this development and his best alternative market opportunity if his objective is the maximization of his utility.

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*Obviously, if an allocation of the cost of installing the trunk sewer line which fulfills this condition can be developed, it will necessarily be true that the total benefits which are obtained by all of these developments as a result of the provision of this sewerage system will exceed the total cost of providing the system; and, hence, the provision of the sewerage system will unambiguously promote the attainment of social optimality.

Although, in general, it should be possible to obtain reasonably accurate estimates of both the revenues which will be generated by any particular development or any other investment opportunity and the costs which must be incurred in performing any particular development or pursuing any other investment opportunity or market opportunity, technical and motivational problems may preclude the obtaining of any reasonably accurate estimates of property owners' personal valuations of either physical developments on real property or other market opportunities. The provision of adequate estimates of personal valuations normally requires detailed knowledge of a property owner's tastes and preferences -- knowledge which he commonly will have no motivation to divulge accurately to the administrative agency responsible for the provision and financing of sewerage services. Rather, to the extent that his revelations of his personal valuation of either a particular development or any other market opportunity can be expected to influence the charge which he will be required to pay for the sewerage services which serve the development, it will be rational for any property owner to understate his personal valuation of the development and to overstate his personal valuations of all alternative market opportunities. Consequently, the best obtainable estimate of the total benefit which a utility maximizing property owner will obtain from the provision of sewerage service to the development on his property usually will be relatively crude; and, hence, it will almost invariably be impossible to guarantee that any particular allocation of the cost of installing any trunk sewer line will unambiguously promote the attainment of the socially optimal pattern of development.

Moreover, the difficulties associated with obtaining adequate estimates of the full additional cost of providing sewerage service to any particular development which have been delineated in this example will increase substantially in magnitude if the simplifying assumptions of the simultaneous development of all properties served by the sewerage facility and the impossibility of expanding the geographic area served by this facility are relaxed. The relaxation of these assumptions introduces the additional problems of predicting the nature, timing, and pattern of the development which will occur within the geographic area which might be served by the sewerage facility; determining the appropriate amount of excess sewer capacity to provide at any point in time to support the anticipated future development; and establishing a socially desirable policy for financing the provision of this excess capacity.

Despite the introduction of these additional problems, the unambiguous promotion of the attainment of social optimality still requires that the sewerage facilities which are installed in any area at any point in time must be financed in a manner which imposes a charge upon the owner of each development served by these facilities which does not exceed the total benefits obtained by this property owner from the provision of these facilities to his development. However, the information which is required to guarantee that the provision of any particular sewerage system will fulfill this condition is substantially greater than the information which is required to serve this purpose in the more restrictive situation which has already been analyzed. Specifically, in this more realistic situation, it is necessary, first, to forecast both the type of development which will be introduced upon each parcel of land which will be served by the sewerage system and the point in time at which this development will be introduced and, then, to estimate the values of the previously described costs, revenues, and personal valuations which can be expected to be associated with each of these developments if the predicted nature and timing of the development actually prevails. Therefore, the possibility of guaranteeing that any particular allocation of the cost of installing a sewerage system will unambiguously promote the attainment of social optimality decreases systematically as the complexity and reality of the situation in which the sewerage system is being provided increases.

In addition, obviously, these same empirical difficulties will arise to a greater or lesser extent in any attempt to determine an allocation of the total cost of providing any other type of public facility (e.g., municipal water supply, public streets and roads, electricity generation and distribution, telephone service, natural gas supply, solid waste disposal, police protection, fire protection, or, even, educational services) among the owners of all of the developments which are served by the facility in a manner which will unambiguously promote the attainment of the socially optimal pattern of development. Therefore, it will generally be impossible to develop an allocation of the total cost of providing any public facility which can be uncontestably demonstrated to promote unambiguously the attainment of social optimality.

Yet, if the value of the total benefits which are obtained by society from the provision of any public facility exceeds the total costs which are incurred by society in providing the facility, there will exist an infinite number of different allocations of these total costs which will unambiguously promote the attainment of social optimality. Therefore, for any public facility whose provision generates total benefits whose value to society is greater than the total cost of its provision, some possibility exists that an unambiguously socially desirable allocation of this cost can be derived from the available information concerning the value of the public facility to the owners of the developments which it serves.

5.7.2 Expected Deviations from Social Optimality

Nevertheless, for any allocation of the cost of providing a public facility among the owners of the developments which are served by the facility which has been established on the basis of less than perfect information, there inevitably will exist some possibility than the imposition of this cost allocation will exert some socially undesirable influences upon the pattern of development. In particular, in the context of the example developed in the preceding section, if the provision of a certain sewerage system is financed through a cost allocation which imposes upon each owner of a development which is served by the system a charge which is equal to the cost of installing the individual sewer line which connects his development to the trunk sewer line, this financing mechanism will precipitate the provision of a socially undesirable sewerage system if the value of the total benefit which is obtained by each of these property owners as a result of the provision of the sewerage system exceeds the charge which is imposed upon this property owner and if the total cost of providing the system exceeds the value of the total benefits which are obtained by all of these property owners from the sewerage system.

Conversely, if the provision of the sewerage system is financed through a cost allocation which imposes upon each of these property owners a charge which exceeds the cost of installing the sewer line which connects his development to the trunk sewer line, this financing mechanism will preclude the establishment of a socially desirable development if the charge which is imposed upon the owner of this development exceeds the value of the total benefit which he obtains from the provision of sewerage service to the development and if the value of this total benefit exceeds the cost of installing an individual sewer line connecting his proposed development to the trunk sewer line and if the value of the total benefits which are obtained by the owners of all of the developments which are served by the sewerage system exceeds the total costs of providing the system. Moreover, it is possible that, in some instances, a financing mechanism of this type will simultaneously precipitate the provision of a socially undesirable sewerage system and preclude the establishment of some developments which are socially desirable given that this sewerage facility has been provided. These results will be observed if the value of the total benefit which is obtained from the sewerage system by each owner of a development which eventually is served by the sewerage system exceeds the charge which is imposed upon this property owner and if the value of the total benefit which would have been obtained from the sewerage system by any owner of a property upon which development has been precluded by this financing mechanism is both less than the charge imposed upon this property owner and greater than the cost of installing an individual sewer line connecting his prospective development to the trunk sewer line and if the value of the total benefits which would have been obtained from the sewerage system by all of the property owners whose individual developments are potentially socially desirable is less than the total cost of providing the system.

Thus, in any realistic situation, the possibility clearly exists that the adoption of any policy which attempts to require the owners of new developments to pay the full additional cost of all expansions of public facilities which must be provided to serve these developments will induce the establishment of a pattern of development which deviates to some extent from the socially optimal pattern of development.

5.7.3 Potential Inequities, Abuses, and Enforcement Problems

Obviously, any allocation of the cost of providing an expansion of a public facility which precludes the establishment of some socially desirable developments will create inequities among the owners of the various properties which might be served by this expansion to the extent that this cost allocation will deny potentially attainable benefits to the owners of the precluded developments while permitting the owners of those developments which are undertaken to retain at least some portion of their potentially attainable benefits. In fact, even if an allocation of the cost of providing any particular expansion of a public facility which unambiguously promotes the attainment of social optimality is successfully imposed upon the owners of the developments served by the expansion, this cost allocation might be considered to be inequitable to the extent that it extracts from different property owners different portions of the values of the total benefits which these individuals obtain as a result of the expansion (e.g., if it extracts all of the values of these benefits from some property owners while permitting other property owners to retain substantial portions of the values of their benefits).

Similarly, in any situation in which the timing of development causes the provision of excess capacity of some public facility during some time periods to be potentially socially desirable, the manner in which the carrying costs associated with the provision of this excess capacity are allocated among the owners of developments which are introduced at different points in time may create inequities in the treatment of these property owners. In addition, since the particular allocation of the cost of providing any expansion of any public facility which is imposed upon the owners of the developments served by the expansion will directly affect the wealth of these property owners, motivations will exist for each of these property owners to offer inducements to the public officials who are responsible for the establishment of this cost allocation to encourage the adoption of a cost allocation which is favorable to his interest. Whether these inducements assume the form of the direct payment of bribes or the oblique exercise of political influence, if they are successful in producing a modification of the allocation of the cost of providing the extension which is adopted by these public officials, these inducements will necessarily affect the equity of the manner in which the net benefit attributable to the provision of the expansion are distributed among the owners of the developments which it serves.

5.7.4 Legal Constraints and Political Acceptability

The legal constraints which can be expected to confront any political jurisdiction which desires to implement a policy requiring the owners of new developments to pay the full additional cost of all expansions of public facilities which serve their developments can be inferred from the legal constraints which presently confront political jurisdictions which impose subdivision exactions upon property owners who wish to subdivide their properties prior to development or sale. Essentially, a subdivision exaction consists of a requirement that any property owner desiring approval of a proposed subdivision plan must either dedicate portions of his property to the municipality as sites for public facilities or directly install certain public facilities upon his property or make monetary payments to the municipality in lieu of either the dedication of property or the direct installation of public facilities before this approval will be granted.

To gain the approval of the courts, a subdivision exaction must be determined to constitute a legitimate police power regulation. Thus, the subdivision regulation which provides for the exaction must be authorized by enabling legislation and must reasonably promote the health, safety, morals, or general welfare of the community upon which the regulation is imposed. If the regulation fails to fulfill these requirements, the imposition of this subdivision exaction upon any property owner will constitute a violation of the property owner's right to receive just compensation for property which is confiscated by the government. Under these circumstances, unless the court determines that the exaction actually has been performed voluntarily by the property owner,* the property owner will be entitled to the reimbursement of any expenditures which he has made in installing public facilities and the restitution of any property which he has dedicated to the municipality to satisfy the invalid regulation.

Moreover, in addition to these police power requirements, two other potential restrictions upon any political jurisdiction's ability to impose subdivision exactions should also be mentioned. First, if a court which recognizes exclusionary tactics determines that the subdivision exactions which are established by a municipality have been designed to increase the cost of development so greatly that they will effectively exclude a substantial number of prospective residents from the municipality, the court may declare the exactions to be invalid. Second, if the subdivision exactions which are imposed by a municipality are determined by the court to be discriminatory in a manner which violates the equal protection clause of either the Federal constitution or the relevant state constitution, the exactions may be declared to be invalid.

Nevertheless, despite these considerable legal requirements, the courts have permitted political jurisdictions to impose subdivision exactions in numerous situations. In particular, the courts have generally permitted municipalities to require a subdivider to improve the streets within his subdivision and, then, to dedicate the improved streets to the municipality.** Moreover, a subdivider generally may be compelled to supply sewerage, water, and drainage facilities to serve his subdivision. In fact, some courts have declared that the installation of these facilities by the subdivider may be required by the municipality even in situations in which the subdivider must construct some facilities outside of the boundaries of his subdivision to fulfill the stipulations of the regulation.* Similarly, some cases have permitted municipalities to require that telephone and electrical transmission lines must be installed underground.**

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*Gregory Manor vs. City of Clifton, 53 N.J. Super. 482, 147 A.2d 595 (1959).

**See cases cited in Rathkop (81) at 71-55 n. 9.

However, the receptiveness of the courts to the imposition of subdivision exactions for either recreational or educational purposes is less widespread. Some states have provided statutory authorization for the dedication of land for recreational purposes;*** and, hence, some courts have permitted municipalities to require the dedication of land for these purposes.**** However, other states have provided statutory authorization which merely permits political jurisdictions to require subdividers to reserve land for recreational purposes so that these political jurisdictions may eventually purchase this property by exercising their power of eminent domain.***** The mere reservation of land does not require a subdivider to bear any significant portion of the cost of providing a proposed recreational facility, since he will be compensated for the value of the land which is reserved when the political jurisdiction condemns the property.

Even greater difficulties confront any attempt to impose subdivision exactions for educational purposes. In fact, in one New Jersey case, the court has strongly indicated that all education facilities must be financed by the general public. Specifically, this court has declared:

> It is the duty of the municipality to educate our citizenry; to build schools, equip and maintain them for such purposes. The cost for public education, in a democratic society, must

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*Johnson vs. Benbrook Water and Sewer Authority, 410 S.W. 2d 644 (Tex. Civ. App. 1967) and Rounds vs. Board of Water and Sewer Commissioners, 347 Mass. 40, 196 N.E. 2d, 209 (1964).

**Brazor vs. Borough of Mountainside, 55 N.J. 456, 262 A.2d 857 (1970), and Sansoucy vs. Planning Board of Worcester, 246 N.E. 2d 811, 355 Mass. 647 (1969).

***See, for example, Conn. Gen Stat. § 8-25.

****Billings Properties, Inc. vs. Yellowstone County, 144 Mont. 25, 394 P.2d 182 (1964). See also the cases discussed in 43 A.L.R. 3d 862.

*****See, for example, Md. Gen. Laws Ann. § 66B-26A.

> be borne by the public and the funds to be used for such purpose must be raised by public taxation.... It is my opinion that any attempt to compel a developer to pay for building a school, or to donate land for a school, as a condition precedent to giving.... approval to a subdivision is violative of his constitutional rights.*

Nevertheless, one court has permitted a municipality to require the dedication of land for educational and recreational purposes.** However, at the present time, it appears that no court has ruled upon a case concerning a subdivision exaction requiring a subdivider to construct an educational facility. Thus, case law will presently not support a subdivision regulation which requires a subdivider to build a school upon his property.

Finally, one additional problem arises in the imposition of subdivision exactions if a municipality desires to require a subdivider to pay a fee in lieu of the dedication of land or the installation of a public facility instead of requiring him to perform either of these other actions. A fee of this type is not a general tax. Rather, it is more like a special assessment. Consequently, like a special assessment, the use of the fee must confer a special benefit upon the party from whom it is collected, although it does not have to fulfill the constitutional requirement of uniformity which a general tax must satisfy. The requirement that the revenue obtained from the imposition of a fee in lieu of the dedication of land must be used to benefit the property owners from whom the fee is collected has precipitated the invalidation of fees of this type in some instances. For example, in Aunt Hack Ridge Estates, Inc. vs. Planning Commission of Danbury,** the court declared a fee to be unconstitutional because the revenues generated by the fee were used to provide recreational facilities which would benefit the entire community rather than just the property owners who were required to pay the fee. Nevertheless, other courts have permitted the imposition of fees in lieu of the dedication of land when definite standards have been established for the imposition of the fees and when the facilities financed by the fees have been demonstrated to benefit the individuals from whom the fees have been collected.* In fact, in Jordan vs. Village of Menomonee Falls,** the court has substantially extended the range of circumstances in which the imposition of fees in lieu of the dedication of land might be determined to be judicially acceptable. In this case, the court has been confronted with a municipal ordinance which permits the imposition of a fee of $200 per lot in lieu of the dedication of land if this dedication is not feasible or compatible with municipal plans. Part of the revenue generated by the imposition of this fee is designated for the provision of recreational facilities; while the remainder of this revenue is reserved for use by the school district. The court has upheld the validity of this fee despite the absence of any specific authorization for the imposition of a fee of this type in any enabling legislation, on the grounds that the fee constitutes a necessary component of the municipality's dedication procedures. Moreover, the court has also declared that, because payment of the fee constitutes a requirement for subdivision approval, the fee is not a tax and, hence, does not have to fulfill the requirements which are applicable to special assessments. Clearly, to the extent that courts generally accept the precedents established in this decision, the range of application of fees in lieu of the dedication of land will be greatly expanded.

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*Midtown Properties, Inc. vs. Madison Township, 68 N.J. Super. 197, 172 A.2d 40, 47, (1961).

**Jordan vs. Menomonee Falls, 28 Wis. 2d 608, 137 N.W. 2d 442 (1965).

***27 Conn. Supp. 74, 230 A.2d 45 (1967).

Nevertheless, this range of application will still be constrained by the legal restrictions which limit the general ability of political jurisdictions to impose any form of subdivision exaction. Consequently, it appears unlikely that the imposition of fees in lieu of the dedication of land will ever be legally capable of requiring the owners of new developments to pay the full additional cost of all expansions of public facilities which must be provided to serve these developments. Yet, since the establishment of a new development, in general, will precipitate increases in both the assessed value of the property on which the development is established and, hence, the total property tax imposed upon this property, the sum of this increase in the total property tax and any fees which can legally be imposed may permit the municipality to recover a substantial portion of this full additional cost.

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*Associated Home Builders vs. Walnut Creek, 4 Cal. 3d 633, 94 Cal. Rptr. 630, 484 P.2d 606 (1971) and Jenad, Inc. vs. Scarsdale, 18 N.Y. 2d 78, 271 N.Y.S. 2d 955, 218 N.E. 2d 673 (1966).

**28 Wis. 2d 608, 137 N.W. 2d 442 (1965).

Yet, for a policy which requires owners of new developments to pay the full additional costs of all expansions of public facilities which must be provided to serve these developments to be adopted by a municipality, the policy must be politically acceptable within this municipality. Since the adoption of a policy of this type will provide net benefits to some constituents of the municipality (e.g., most taxpayers whose total tax burdens will decrease as a result of the implementation of the policy) and will impose net costs upon other constituents of the municipality (e.g., the owners of properties which are potentially suitable for development), the political acceptability of any policy of this type will be strongly influenced by the relative political influence of those constituents who obtain net benefits from its adoption and those constituents who incur net costs as a result of its implementation. Moreover, the greater is the extent to which a comprehensive policy of this type is considered by the constituents of a municipality to be similar to existing subdivision exaction requirements, the greater is the likelihood that the policy will be acceptable to these constituents.

5.7.5 Expected Impacts Upon Land Use Patterns

Since any policy which requires the owners of new developments to pay the full additional costs of all extensions of public facilities which must be provided to serve these developments imposes charges only upon property owners who establish new developments, the initial implementation of a policy of this type should not precipitate any substantial modifications in the prevailing land use pattern. Rather, to the extent that the adoption of this policy causes the owners of properties which are potentially suitable for development to recognize and incorporate into their decision-making costs which they would have ignored in the absence of this policy, the policy will discourage the establishment of some developments which otherwise would have been undertaken. Thus, relative to the pattern of development which would have prevailed in the absence of this policy, the adoption of this policy can be expected to limit the overall rate of growth of the municipality in which the policy has been established. Moreover, since the charges imposed upon the owners of new developments under this policy can be expected to discourage the establishment of developments which would have competed with and, possibly, supplanted the land uses which have been established prior to the adoption of this policy, the policy can also be expected to increase the temporal stability of these pre-existing land uses.

5.8 The Most Appropriate Level of Government to Implement Any Policy

Theoretically, it is most socially desirable to assign the responsibility for the administration of any public policy to the lowest (i.e., most local) level of government which has sufficient authority to exercise effective control over all of the individuals who are involved in the situation addressed by the policy. Assigning the administrative responsibility for a public policy to any lower level of government necessarily will prevent the agency to which the responsibility is assigned from applying the policy to all of the individuals who are involved in the situation which the policy addresses and, hence, will generally preclude any possibility of attaining social optimality through the application of the policy. Conversely, assigning this responsibility to any higher level of government normally will decrease the responsiveness of the administration of the policy to the interest of the individuals to whom the policy is applied. Thus, theoretically, the responsibility for the administration of a policy for the control of a particular externality should be assigned to the lowest level of government which includes as constituents all of the individuals who are affected by the externality; while the responsibility for the administration of a policy concerning the provision of a particular public facility should be assigned to the lowest level of government which includes within its jurisdiction all of the parcels of land which might be efficiently served by a single public facility system of this type.

However, this theoretical rationale for the assignment of administrative responsibility ignores several practical considerations associated with the administration of public policies. First, the cost of administering a public policy is not independent of the level of government to which the responsibility for this administration is assigned. Rather, since the assignment of the responsibility for the administration of any particular policy to successively higher levels of government normall will systematically increase the complexity of the decision-making hierarchy which is required to perform this administration, it can generally be expected that the cost of administering any particular policy will increase as the level of government to which the responsibility for this administration is assigned increases. Consequently, in selecting the most appropriate level of government for the administration of any particular policy, it will generally be necessary to balance the expected increase in the probability of attaining social optimality which is associated with the assignment of the responsibility for the administration of the policy to a higher, more comprehensive level of government against the increased cost of administering this policy which will be precipitated by this reassignment of administrative responsibility.

Second, since the capabilities which are required to perform the administration of any new policy may exhibit strong similarities to the capabilities required for the administration of existing policies and since the cost of initiating the application of the new policy is likely to be substantially lower if the responsibility for its administration is assigned to a level of government which has already assembled and coordinated the capabilities required for this administration in its administration of another policy than if this responsibility is assigned to a level of government which has not yet developed these capabilities, it can generally be expected that the total cost of administering any particular policy will be lower if the responsibility for its administration is assigned to a level of government which has already developed the capabilities required for this administration in another context than if this responsibility is assigned to some other level of government. Thus, in the context of the policies which have been analyzed in the previous seven sections, comparative administrative advantages should exist for the assignment of the responsibility for the administration of a policy of ad valorem property taxation with tax rates conditional upon land use to a level of government which already administers a standard property tax policy and for the assignment of the responsibility for the administration of the public purchase of scenic or environment easements to a level of government which already has substantial experience with exercising the power of eminent domain and for the assignment of the responsibility for the administration of a policy which requires the owners of new developments to pay the full additional cost of all expansions of public facilities which must be provided to serve these developments to a level of government which already is responsible for the provision of some of these public facilities. However, once again, in selecting the most appropriate level of government for the administration of any of these policies, it will generally be necessary to balance the cost of administering the policy which is associated with the assignment of the responsibility for this administration to any particular level of government against the expected probability of attaining social optimality which is provided by this assignment of administrative responsibility.

Yet, it is impossible to perform this balancing of the relative advantages and disadvantages of assigning the responsibility for the administration of any of the previously analyzed policies to any particular level of government without detailed knowledge of both the technical characteristics of the externality or public facility situation to which this policy will be applied and the initial and ongoing administrative costs which will be associated with any particular assignment of responsibility for the administration of the policy. Unfortunately, the resource constraints of this project have precluded the accumulation of this detailed knowledge for even a small sample of political jurisdictions. Moreover, even if this information were collected for a representative sample of political jurisdictions for each of the previously analyzed policies, it is unlikely that this sample information would support the determination of a single optimal level of government for the administration on any particular policy in all situations. Rather, it is likely that, because of differences in the technical characteristics of the various externality or public facility situations to which a particular policy can be applied or because of differences in the administrative structures of superficially similar public agencies in different political jurisdictions, the most appropriate level of government for the implementation of any particular policy will not be uniform across all situations in which the policy might be applied. In fact, it is conceivable that the responsibility for the administration of most of the previously analyzed policies in any particular geographic area might appropriately be assigned simultaneously to several different levels of government. Thus, it might be socially desirable to permit public agencies at several different levels of government to purchase scenic or environmental easements simultaneously in the same geographic area or to assign the responsibility for requiring the owners of new developments to pay the full additional cost of expansions of different public facilities in a particular geographic area to public agencies at different levels of government (e.g., to finance the provision of police and fire protection at the local level of government, while financing the provision of sewerage service at the regional level os government). However, the determination of the most appropriate level or levels of government for the administration of any particular policy in any particular situation will virtually inevitably constitute an empirical issue which cannot be resolved definitively solely on the basis of theoretical considerations -- although theoretical considerations might be able to limit substantially the range of alternative levels of government to which this administrative responsibility might be assigned.

5.9 Conclusions and Recommendations

The preceding analysis clearly demonstrates that, in any realistic situation, none of the policies evaluated in this chapter can reasonably be expected to promote unambiguously the attainment of social optimality. Therefore, it is extremely unlikely that the implementation of any of the policies actually would result in the establishment of the socially optimal pattern of development in any realistic situation.

However, the socially optimal pattern of development is a theoretical concept whose mere identification in any situation involving either externalities or the provision of public facilities requires the availability of perfectly accurate information concerning the tastes and preferences of all utility-maximizing individuals who are affected by the situation, the revenue opportunities of all profit-maximizing individuals who are involved in the situation, the cost conditions confronting these utility-maximizing and profit-maximizing individuals both separately and in combination, and the social welfare function of the community in which the situation has arisen. Moreover, as the analysis in the preceding sections has demonstrated, the obtaining of this perfectly accurate information is, at best, costly and, for some items, theoretically impossible. Recognizing these practical difficulties in even identifying the socially optimal pattern of development, it becomes obvious that the development of any policy which will unambiguously promote the attainment of this pattern of development will almost inevitably be impossible.

Consequently, it is obviously unreasonable to adopt as a necessary condition for the implementation of any policy for the control of externalities or the provision of public facilities a requirement that the policy must unambiguously promote the attainment of the socially optimal pattern of development. Rather, in making a decision concerning the social desirability of developing and implementing any policy for the control of externalities or the provision of public facilities, it is more reasonable to base this decision upon the ability of the policy to promote the attainment of a pattern of development which is more socially desirable than the pattern of development whose attainment will be promoted by any other policy which has been developed for the same purpose.

On the basis of this criterion, it is possible to generate some preliminary conclusions concerning the potential social desirability of implementing the various policies which have been evaluated in this chapter. However, unfortunately, the resource limitations of this project have precluded both the surveying of political attitudes and the measurement of public and private administrative costs which would be required for the provision of a definitive recommendation concerning the social desirability of implementing each of these policies. Nevertheless, the theoretical analyses developed in this report do provide sufficient information to support relatively strong conclusions concerning the general social undesirability of implementing several of these policies.

In particular, these analyses strongly suggest that the implementation of a policy of ad valorem property taxation with tax rates conditional upon land use generally will be socially undesirable because any realistic policy of this type can be expected in many instances to provide incentives to property owners which not only fail to encourage these property owners to perform certain socially desirable actions, but actually discourage these property owners from performing these socially desirable actions. Moreover, this policy's requirement that the total tax bill which is imposed upon any property to which a particular land use classification is assigned must be strictly proportional to the assessed value of the parcel can reasonably be expected to cause this policy to produce a pattern of development which is less socially desirable than the pattern of development which would have been produced in the same situation by a more flexible policy for the control of externalities.

Similarly, it will generally be socially undesirable to implement a policy requiring the transfer of lump-sum payments for externalities prior to changes in the permissible land use status of properties. The extreme volume of information which is required for the development and implementation of a policy of this type necessarily will cause the cost of developing this policy in any realistic situation to exceed the cost of developing many alternative policies for the control of externalities. Moreover, the theoretical and practical difficulties associated with obtaining reasonably accurate estimates of a substantial portion of this desired information inevitably will cause the structure of payments which initially is embodied within a policy of this type in any realistic situation to deviate sufficiently from the socially optimal structure of payments that the implementation of the policy will produce a pattern of development which is less socially desirable than the patterns of development which would have been produced in this same situation by some alternative policies with more modest information requirements.

Finally, since a policy requiring lump-sum payments for externalities requires the transfer of a payment only on those relatively infrequent occasions when modifications of activity are initiated which entail changes in land use classifications, the likelihood that the payments which are initially specified in a policy of this type will be adjusted appropriately to correct for initial errors in estimation can be expected to be substantially lower than the likelihood that adjustments of this type will be performed in policies which are applied on a regular periodic basis. Thus, the social undesirability of adopting a policy requiring lump-sum payments for externalities relative to alternative policies for the control of externalities can be expected to increase, rather than decrease, over time.

Next, it appears doubtful that it will be socially desirable to establish a policy of convening public hearings involving all individuals who are affected by particular externalities to promote negotiated settlements of these externality problems. Public hearings of this type are likely to be successful in producing unambiguously socially desirable negotiated settlements only in externality situations which involve only a small number of individuals -- externality situations in which private negotiations are also reasonably likely to produce mutually agreeable and, hence, socially desirable settlements. However, in externality situations which involve relatively large numbers of individuals, it is extremely likely either that no negotiated settlement will be attained or, if less than the unanimous consent of all of the individuals who are involved in the negotiations is required for the adoption of a settlement, that the pattern of development which is produced by the negotiated settlements which actually are adopted will not be any more socially desirable than the patterns of development which would have been produced in the same situation by some other policy for the control of externalities.

Finally, the adoption of a policy encouraging the formation of landowner development corporations will virtually inevitably be socially undesirable because the formation of a landowner development corporation which is sufficiently comprehensive to control effectively the externalities which arise among private land uses in a geographic area necessarily will provide to the shareholders of this corporation substantial monopoly control over the development and use of land in this area. Since the formulation of a public policy to regulate the corporation's exploitation of this monopoly power will require the accumulation of the same information which will be required for the development of a public policy to control the generation of externalities among private land uses directly, the formation of a landowner development corporation will provide no particular benefits for society and, hence, should not be encouraged.

However, the remaining three policies which have been analyzed in this chapter appear to exhibit sufficient potential as mechanisms for the socially desirable control of externalities or the socially desirable provision of public facilities to warrant further consideration for implementation. In particular, both the imposition of annual "externality" fees and the public purchase of scenic or environmental easements offer sufficient flexibility in their tax and subsidy structures at any point in time and sufficient adaptability of these structures over time to present the possibility that the implementation of these policies will produce increases in the social desirability of the pattern of development in a geographic area which are large enough to justify incurring the costs of developing and implementing these policies. Similarly, a policy which attempts to require the owners of new developments to pay the full additional cost of all expansions of public facilities which must be provided to serve their developments should cause these property owners to bear a sufficiently larger portion of this full additional cost than they bear under the prevailing methods of financing the provision of expansions of public facilities to produce an increase in the social desirability of the pattern of development in a geographic area which is large enough to justify incurring the costs of formulating and implementing this pricing policy.

Nevertheless, it is impossible to advance an unqualified recommendation that any of these three policies should actually be applied in any geographic area solely on the basis of the theoretical analyses developed in this report. Rather, it will be necessary to perform additional research into the administrative requirements, political acceptability, and information processing needs of each of these policies before an unqualified recommendation can be expressed concerning the social desirability of adopting any of these policies.

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